THE Journal

APRIL

1951

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Be first with the finest...

Because the forms of Trubyte Bioform Teeth are exact copies of attractive, natural teeth and because the blends of Trubyte New Hue Shades are so *alive* in appearance, you can now produce dentures that are definitely better looking and more natural.

Because Trubyte Bioform Porcelain is "vacuum fired" and consequently denser and stronger, these same natural looking dentures will be more serviceable and more durable.

trubyte

teeth

You can depend on Trubyte

The Result of Recent Biological Discoveries and of Important Developments in the Manufacture of Porcelain Teeth . . .

NEW IN EVERY WAY

- Actual copies of attractive natural teeth
- Each size a duplication of another set of natural anteriors
- Harmonize with the outline form of the face, profile and cheek planes
- "Vacuum fired porcelain"—denser, stronger and more "alive" in appearance
- New blends in Trubyte New Hue Shades—react to all lights in much the same way as do natural teeth
- The shades are approximate reproductions of Trubyte New Hue Shades. There are slight variations in the shades of Trubyte Bioform Teeth as is characteristic of fine, natural teeth
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- The fully formed linguals are comfortable to the tongue and aid phonetics

TRUBYTE BIOFORM TEETH ARE AVAILABLE FROM YOUR TRUBYTE DEALER

DEELASTIC

the ideal impression material

The important thing in a partial restoration is — *accurate* fit. To get accurate fit you have to take an *accurate* impression. When you use DEELASTIC you can be sure of an accurate impression every time. For this true hydrocolloid material has the qualities needed to reproduce precisely every detail of the contours of teeth and tissue. It is creamy smooth, easy to control, has exceptional flow, yet its consistency is such that it can be withdrawn *in one piece and without distortion.*

If you have never used DEELASTIC we suggest you try it. Then you will understand why it has won wide favor as the *ideal impression material.* It comes in convenient metal tubes and is prepared by heating the tube in a pan of boiling water or with the mixing gun shown at left.

Because it gives such a high degree of accuracy DEELASTIC is also widely used for indirect inlay technic. For this purpose it comes in jars of small 5/16" and 3/8" diameter sticks, called "Midgets."

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"The bonds William and I bought for our country's defense helped build a house for us!"

HOW U. S. SAVINGS BONDS PAID OFF FOR MRS. ROSE NYSSE OF BRISTOL, PA.

"There's nothing more wonderful than a house and garden of your own," says Mrs. Nysse, "and no surer way to own one than to save for it through U. S. Savings Bonds and the safe, sure Payroll Savings Plan!"

Mrs. Rose Nysse says, "In 1942 William and I started making U. S. Savings Bonds a part of our plan for financial security. I joined the Payroll Savings Plan at the Sweetheart Soap Co. where I work, and began buying a $100 bond a month, knowing my money was safe and working for me. U. S. Savings Bonds certainly make saving easier!"

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You can do what the Nysses are doing —the time to start is now!

Maybe you can't save quite as much as William and Rose Nysse, maybe you can save more. But the important thing is to *start now!* It only takes three simple steps.

1. Make the big decision—to put saving *first*—before you even draw your pay.
2. Decide to save a regular amount *systematically*, week after week, or month after month. Even small sums, saved on a systematic basis, become a large sum in an amazingly short time!
3. Start saving by signing up *today* in the Payroll Savings Plan where you work or the Bond-A-Month Plan where you bank.

You'll be providing security not only for yourself and your family, but for the blessed free way of life that's so very important to every American.

FOR YOUR SECURITY, AND YOUR COUNTRY'S TOO, *SAVE NOW*— THROUGH REGULAR PURCHASE OF U. S. SAVINGS BONDS!

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The Journal of the American Dental Association, Vol. 42, No. 4. Published by the American Dental Association, 222 E. Superior St., Chicago 11, Ill. Yearly subscription $7.00 for U. S. and possessions; $8.00 for foreign countries. Single copy seventy-five cents. Entered as second-class matter, December 31, 1947, at the postoffice at Chicago, Ill., under the act of March 3, 1879. Published monthly. Copyright 1951 by the American Dental Association. The Journal of the American Dental Association is indexed in the Index to Dental Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.

Superior wetting agent gives finer casting surfaces

To give perfect casting surfaces, a dental investment must be spread over all critical areas. Surface tension that inhibits the free flow of liquids may prevent the investment from spreading as it should.

When Quickset—Durallium's new investment—was created, the fine silica particles of Quickset were to flow smoothly and fill all crevices. In order to best utilize the outstanding advantages of Quickset, Durallium researchers sought a method of reducing surface tension.

It was determined that a unique wetting agent was necessary to reduce or eliminate existing surface tension. After an extensive study of scientific knowledge on the subject, the researchers conducted an analysis of hundreds of liquids and combinations of liquids, subjecting them to stringent tests. As a result of persistent analysis, a wetting agent was developed, specifically for use with Quickset, which virtually eliminated surface tension. We call it Lavon Pattern Wash.

Lavon is painted on the wax pattern and all casting surfaces before investing. Result: An unbroken film of Quickset investment adheres to all casting surfaces. This film of fine silica particles gives perfect reproduction of detail, resulting in exceptionally smooth and accurate Durallium castings.

Lavon Pattern Wash is an integral part of the Durametric technique. With Durallium and Durametrics, Durallium laboratories are equipped to give you restorations that are unparalleled for accuracy and detail—unequalled for patient comfort and satisfaction.

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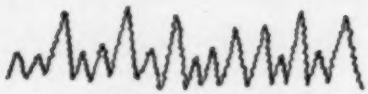
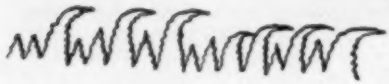
MAKING MAGIC OUT OF MOUNTAINS!



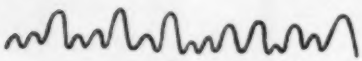
SAD

Greatly magnified view of surface of case, as cast, shows mountains like this . . .



SMEARED

Mechanical polishing smears the surface like this . . .



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TI-LECTRO polishing cleans the surface and gets greater reflectivity by smoothing the peaks.

Result: Cases have new, lasting brilliance, better fit.

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STREET _____

CITY _____ ZONE _____ STATE _____

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Learn why so many dentists from Maine to California are relying on REPLICAST precision removables to enhance the scope and prestige of their partial denture service. Mail the coupon or write for full particulars now.

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J41

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See your dentist twice a year

—a slogan now firmly impressed on the minds of *millions* of Americans because Pepsodent advertising has repeated it *billions* of times!

Pepsodent

Division Lever Brothers Company

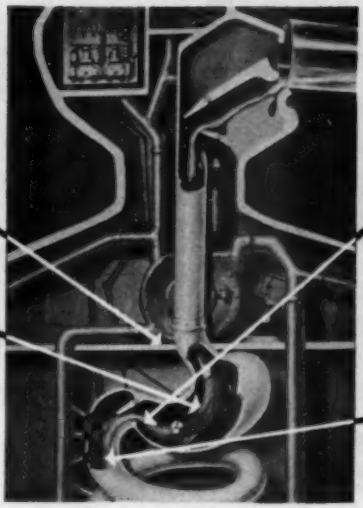
Give faster pain relief with BUFFERIN

ACTS TWICE AS FAST AS ASPIRIN

WITHOUT GASTRIC DISTRESS!

1. BUFFERIN enters the stomach here.

2. BUFFERIN exerts its antacid effect, lessening the possibility of gastric distress.



3. BUFFERIN helps dilate the pyloric valve, promptly leaves the stomach.

4. BUFFERIN's analgesic component is absorbed into the blood *twice as fast as aspirin*, relieves pain.

When you prescribe BUFFERIN to your patients you assure *faster relief of pain*. Clinical studies[1] show that within ten minutes after BUFFERIN is ingested, blood salicylate levels are as great as those attained by aspirin in twice this time. That is why BUFFERIN *acts twice as fast as aspirin.*

BUFFERIN has *greater gastric tolerance.* BUFFERIN's antacid ingredients provide protection against the gastric distress so often seen with aspirin.[1] BUFFERIN, therefore, is especially suited for use when prolonged use of salicylates is indicated.

1. Effect of Buffering Agents on Absorption of Acetylsalicylic Acid. J. Am. Pharm. A., Sc. Ed. 39:21, Jan. 1950.

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Accepted Council on Dental Therapeutics American Dental Association

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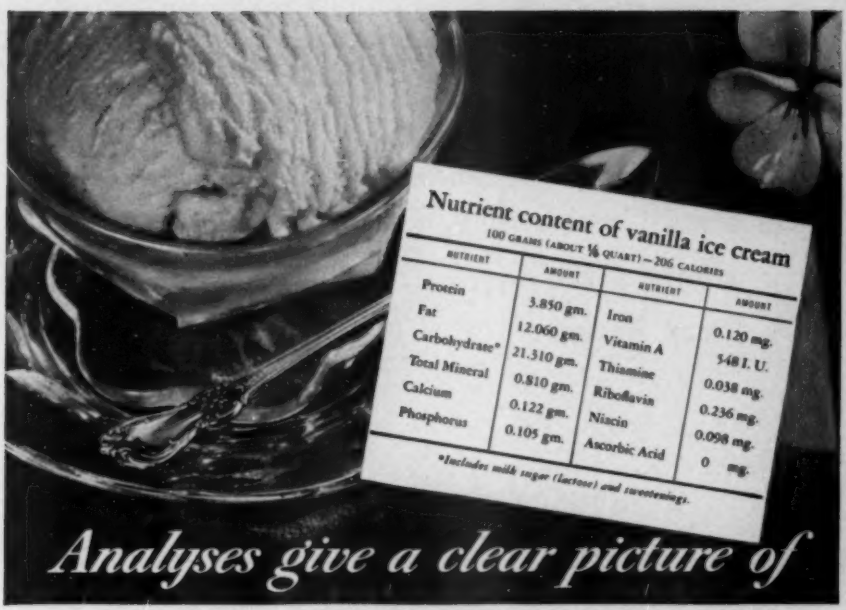
The real *key* to the problem of tooth decay

Recently completed clinical data again confirm the fact that the most important function in the prevention of tooth decay is regular cleansing of the teeth after eating plus regular biannual visits to the dentist.* In order to get your patients to cooperate with this most important function, it is necessary to have them use a tooth paste to their liking; one that tastes good, cleans efficiently and leaves the mouth feeling cool and refreshed. Kolynos Tooth Paste meets these specifications to the letter. When you recommend Kolynos Tooth Paste to your patients, you may be assured that you will invite their cooperation in the consistent and regular function of brushing their teeth after eating and will thus help to prevent tooth decay. For years Kolynos has been the choice of many discriminating dentists throughout the world. Won't you make it your choice too?

* Fosdick, L. S., The Reduction of the Incidence of Dental Caries. I. Immediate Tooth Brushing with a Neutral Dentifrice, J.A.D.A. Vol. 40, No. 2, February 1950.

Kolynos TOOTH PASTE

WHITEHALL PHARMACAL COMPANY • 22 East 40th Street, New York 16, N. Y.



ICE CREAM'S FOOD VALUE

The table, above, provides data on the nutrient content of an average serving (1/6 quart) of vanilla ice cream. Actual analyses were made on ice cream prepared from a formula which was taken to be an average vanilla ice cream mix. The ice cream was made in a commercial ice cream plant under the observation of the scientists making the analyses.*

The table represents the first complete analytical data on a commercial vanilla ice cream. It shows that ice cream may furnish significant amounts of protein, calcium, vitamin A, and riboflavin. One serving of ice cream may provide the same amount of calcium and high quality protein as one-half glass of milk.

More and more nutritionists and others are recognizing that ice cream may make a nutritional contribution to daily meals. Over a period of years the increase in the amount of ice cream consumed by Americans is phenomenal. The present average annual consumption is 28 pints per person. Research continues to reveal facts which give scientific basis for including ice cream at the family table.

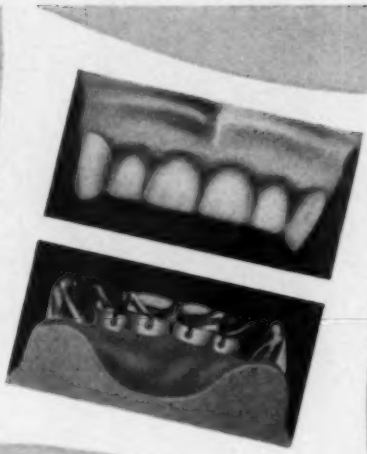
*Dahlberg, A. C. and Loosli, J. K. *Nutritive value of commercial ice cream.* J. Am. Diet. Assn. 24:20 (Jan.) 1948.

The presence of this seal indicates that all nutrition statements in this advertisement have been found acceptable by the Council on Foods and Nutrition of the American Medical Association.

National DAIRY COUNCIL
111 N. Canal Street, Chicago 6, Illinois

Since 1915 . . . the National Dairy Council, a non-profit organization, has been devoted to nutrition research and education to extend the use of dairy products.

a *Tru*pontic
can be used
in almost any bridge
where a facing
can be used



An extreme short bite case
fabricated with Steele's Trupontics

It is suggested that your patient will always receive a better, more satisfactory restoration in any case where one or more of these advantages of the Trupontic tooth can be obtained:

1. Full contour of the lost natural tooth is restored, providing more comfort, more natural "feel."
2. A more sanitary restoration – no recess at the ridge.
3. Only glazed porcelain in contact with tissue.
4. Perfectly suited to immediate extraction cases.

Why not specify Trupontics more often? *Your laboratory can use a Trupontic in almost any bridge where a facing can be used.*

THE COLUMBUS DENTAL MFG. CO. • COLUMBUS 6, OHIO

Steele's *Tru*pontics

FOR THE
CONSTIPATED PATIENT...

Laxative ACTION WITHOUT REACTION

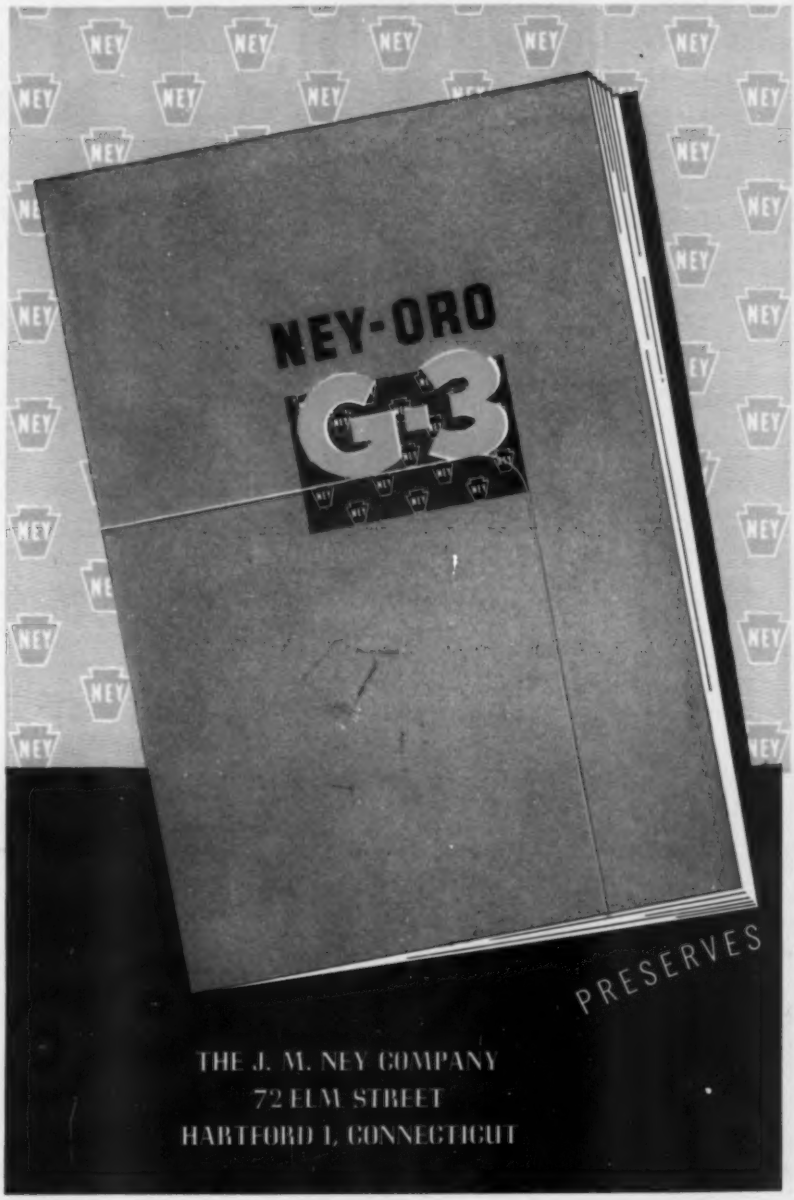
Phospho-Soda (Fleet) has long been authoritatively recognized for its dependable efficacy and desirable qualities in the treatment of intestinal stasis. In average doses, it produces a soft and formed, rather than a watery, evacuation; and its gentle action is quite free from irritation, griping, early tendency toward habituation, or other adverse reactions. Samples on request.

Phospho-Soda (Fleet) is a solution containing in each 100 cc sodium biphosphate 48 Gm. and sodium phosphate 18 Gm. Both 'Phospho-Soda' and 'Fleet' are registered trademarks of C. B. Fleet Co., Inc.

C. B. FLEET COMPANY, INC., LYNCHBURG, VA.

THERE IS ONLY ONE **PHOSPHO-SODA (FLEET)**

A Laxative for *Judicious* Therapy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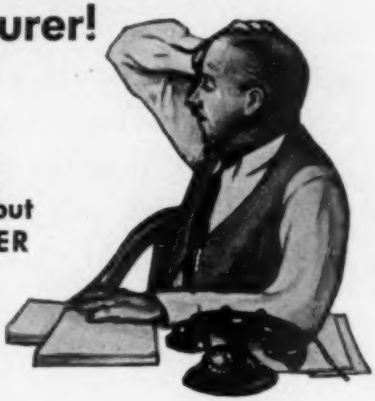
Yours for the asking... the new booklet illustrated at left presents in simple graphic form exactly why NEY-ORO G-3 is so widely accepted by dentists as the ideal material for the construction of partial dentures... and by patients who appreciate the day-in, day-out comfort it affords. Send for your copy today!

MICE exasperate our Treasurer!



Thousands of dollars for laboratory animals exasperate our Treasurer, but they guarantee a SAFER anesthetic for YOU!

■ The tenth of each month, when the bills become due and payable, is a hard day for our treasurer. What depletes the numerical count of his few remaining hairs still further are the mice, rabbits and guinea pigs, and the enormous food supplies they consume.

■ Bills for these laboratory animals and their nourishment amount to many hundreds of dollars each month, but our treasurer is a prosaic fellow, and unlike our Control and Research Departments, he is not fully conscious how essential they are for determining the safety of our local anesthetics before leaving our laboratories.

■ Before each batch of Monocaine is released to the profession, it must be tested first on mice for toxicity by subcutaneous and intravenous injections. Then on rabbits for potency and finally on guinea pigs for tissue irritability. Many laboratory animals are thus sacrificed at the altar to make certain that the Monocaine solutions you are using at the chair will be safe and will not jeopardize the health and well being of your patients.

The exasperation of our treasurer is of minor consideration.

Monocaine is the registered trade mark of the Novocol Chemical Mfg. Co., Inc.

Accepted COUNCIL ON DENTAL THERAPEUTICS AMERICAN DENTAL ASSOCIATION

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This Brush is not Advertised to the General Public

TRADE MARK

Oral B

THE NEW BRUSH DESIGNED TO MEET PROFESSIONAL REQUIREMENTS

PATENTED

3 SIZES — 1 TEXTURE

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Dr. _____

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Try this brush* yourself!

Without actually experiencing the pleasant, refreshed feeling which the Oral B produces, it is impossible to fully appreciate the great difference between this and other brushes. Therefore we urge you to try it yourself!

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Oral B Company

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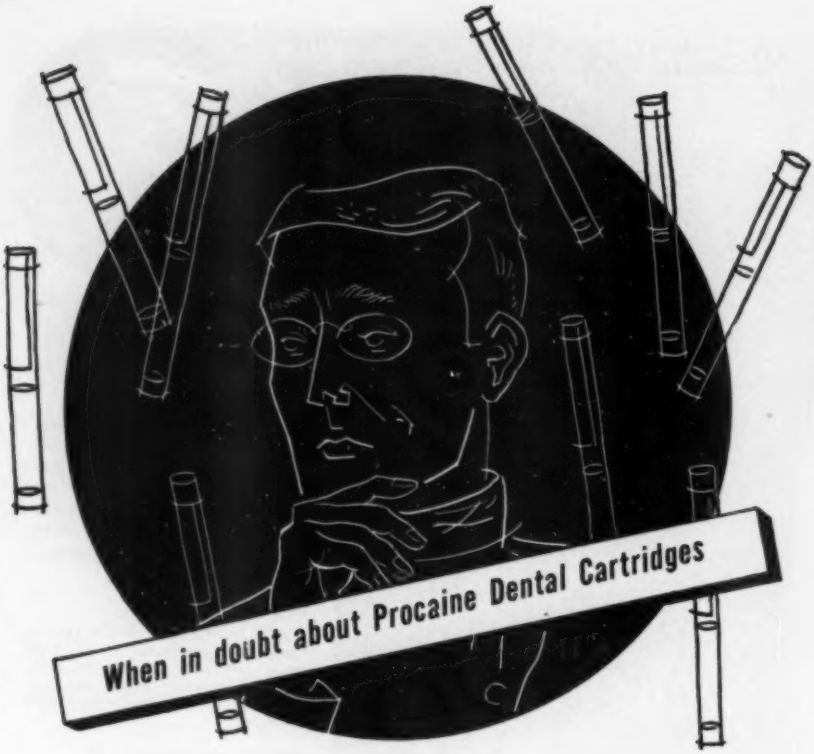

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Accident • Hospital • Sickness

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STERILIZATION
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Formaldehyde 12½%	.50

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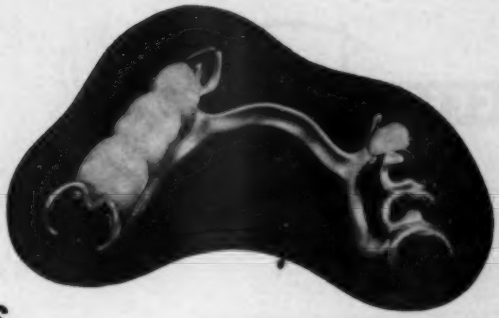

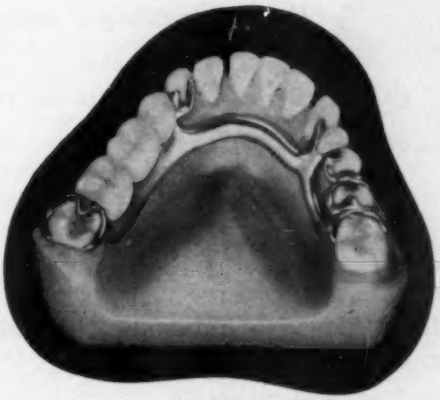

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APRIL 1951 VOLUME 42 • NUMBER 4

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Cancer and the dentist

Leonard B. Goldman, M.D., Elmhurst, L. I., N. Y.

Whether a patient with mouth cancer will live often depends on the alertness of the dentist. Since most persons visit their dentists periodically, early cancer often may be found during a routine dental examination. Moreover, most persons go to their dentists rather than to their physicians when they have symptoms in the mouth.

The mortality rate of mouth cancer during the last 10 years has declined appreciably. In 1936 there were 4,081 deaths from mouth cancer, a mortality rate of 3.19 per 100,000; in 1947 there were 3,735 deaths, a mortality rate of 2.6 per 100,000. This lowered mortality rate has been caused in part, by an increasing cancer awareness on the part of the dentist.

Deaths from mouth cancer can be reduced further by:

1. Intensifying the public dental education program. To the well-known advice "See your dentist twice a year" should be added the slogan: "Your dentist can help you prevent mouth cancer."

2. Having the dentist become more familiar with the predisposing factors and the precursors of mouth cancer, and with the diagnosis of early mouth cancer.

The factors that may predispose to cancer are: infected gums, jagged teeth, ill-fitting dentures and excessive smoking. How much these factors contribute to cancer is unknown. However, it is known that the incidence of cancer is much lower in the well-kept mouth than in the neglected one.

The precursor of cancer of the mouth, leukoplakia, is a white patch on the mucosa. This patch is found most commonly along the bite line of the buccal mucosa and on the tongue.

Early intraoral cancer is a small ulcerated lesion. It is red or reddish yellow in color and often has a ragged granular

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Fig. 1 • Sponge biopsy technic demonstrated on tongue lesion of cancer teaching model

appearance. The early lesion may not be indurated, but as it grows, the tumor becomes firm. Pain and tenderness are present only when the lesion is invasive or secondarily infected.

As the lesion grows it may proliferate inwardly or outwardly. The infiltrative type becomes depressed; it may fissure and have raised edges; the base, if extensive, may be necrotic. Another form of the infiltrative type of lesion may resemble an iceberg in that the mucosal ulceration is slight but the submucosal induration is extensive, giving a stony hardness to the region. The outwardly proliferating type projects irregularly and has a circumscribed base. Neither type is vascular; therefore, bleeding is minimal. The outwardly proliferating tumor has a more favorable prognosis.

Occasionally, a firm nonulcerated prominence is found in the mouth usually on the hard palate. This form of lesion is an aberrant salivary tumor which arises from a minor salivary gland. The tumor often is encapsulated and should not be incised, for if the capsule is broken the tumor may spread and become secondarily infected. A biopsy specimen should be taken by aspiration.

BIOPSY

The definitive step in detecting cancer is to biopsy immediately every red ulcerated area. To wait is dangerous. The patient may not return, or he may delay going to another physician. Meanwhile, the cancer grows.

A specimen for biopsy may be obtained by using a sponge, or by using a scissors or scalpel.

The sponge biopsy technic, a recent advance in cancer diagnosis, was originated by Gladstone.[1] Gelatin and cellulose are two types of sponge being used. A small piece of sponge, 1 by 1 cm., held in a forceps, is pressed against the lesion for 30 seconds and then rubbed briskly over the entire ulcerated surface (Fig. 1). The sponge absorbs particles of tissue, tissue juice and cells. For fixation it is then placed in 10 per cent Formalin. To obtain tissue with the sponge is a simple procedure without inconvenience to the patient. There is no pain, no bleeding and no danger of infection. No anesthetic is needed.

In taking a biopsy specimen in the conventional manner, a small, curved, sharp scissors is best (Fig. 2). Local or regional anesthesia is used. If the lesion is raised, no anesthesia is necessary since malignant tissue does not contain nerve fibers. A 2 to 3 mm. piece of tissue is taken from the most accessible portion of the tumor and placed in 10 per cent Formalin.

1. Gladstone, Sidney A., Application of sponge biopsy for cancer diagnosis in office practice. New York State J. Med. 49:2487 (Nov. 15) 1949.

Often cancer tissue can be recognized by the ease with which a specimen can be removed. Because it has little supporting connective structure cancer tissue does not adhere like nonmalignant tissue. Proper removal of tissue by cutting should always produce slight bleeding. If there is no bleeding, only necrotic tissue has been obtained. The bleeding is stopped easily by gauze pressure.

If the histologic report is positive for malignancy, the patient should be referred immediately to his family physician. If he has no family physician, he should be referred to an oncologist. The dentist should be sure the patient reaches a physician.

If the histologic report is negative for malignancy and nonspecific for another disease, and if healing does not take place, another biopsy specimen should be taken. If the second report is negative, and the dentist is still uncertain of the diagnosis, the patient should be referred to his family physician. The need for taking a biopsy specimen immediately, by the initial examining physician or dentist, is emphasized by the case histories of two patients.

The first case is of a 53 year old man who noticed a sore on the side of his tongue (Fig. 3). He consulted his dentist and was told to see his family physician. A Wassermann test was positive for syphilis. The physician gave antisyphilitic therapy for several months. Growth of the lesion continued and it was not until a node appeared in the submaxillary region that the physician suspected malignancy. The diagnosis was advanced squamous cell carcinoma of the tongue.

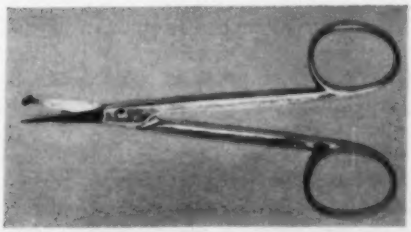

Fig. 2 • Biopsy scissors with 2 mm. biopsy specimen on tip

Fig. 3 • A 1.5 cm. outwardly proliferating lesion on the lateral border of the posterior third of the tongue. Biopsy report was squamous cell carcinoma, grade 2

The second case is of a 34 year old attorney who felt a sore in his right cheek for about 10 days. He asked his dentist to file down the adjacent sharp tooth. The dentist saw a small ulcer on the buccal mucosa (Fig. 4). He filed down the tooth but urged the lawyer to see his physician. Two weeks later the attorney returned for further work on his teeth. When the dentist asked what the physician had said about the ulcer, the attorney replied that he hadn't gone as he had "too many court cases on the calendar and no time." Two months later the attorney visited his physician. Microscopic examination showed a squamous cell cancer. After a stormy 18 months, in spite of competent treatment, the patient died.

Fig. 4 • A 2 cm. verrucous lesion on the posterior lower buccal mucosa. Biopsy report was squamous cell carcinoma, grade 1

GRADES OF TUMORS

Nearly all malignant tumors of the oral cavity are squamous cell carcinomas. These tumors have been divided histologically into grades 1, 2, 3 and 4. The cells in a grade 1 carcinoma are highly differentiated, having pearl formation and few mitotic figures. As the grade increases the cells are less differentiated. A grade 4 tumor is anaplastic and has many mitotic figures. The higher grade tumors grow rapidly and respond to irradiation. However, these anaplastic tumors are more likely to metastasize.

Generally, cancer in the anterior portion of the mouth is low grade, and cancer in the posterior portion is of a higher grade. Carcinomas of the lip are most often grade 1, those of the floor of the mouth and the anterior portion of the tongue are mainly grade 2, and those of the posterior third of the tongue and of the tonsil are predominantly grade 2 plus to 3. Grade 4 tumors, most commonly found in the tonsillar region, may occasionally appear anywhere in the mouth.

EXAMINATION

Just as the dentist has his routine for examining the teeth, so it is suggested he develop a habit of examining every part of the patient's mouth for cancer. Starting with the lips, he may examine the buccal surface of one alveolar border of the mandible and work around to the opposite side of the arch. Then he may examine the lingual surface of the mandible and at the same time examine the floor of the mouth, lifting the tongue. Next he should look at the tongue, especially its lateral borders, and its junction with the tonsillo-lingual fold. Then he should inspect the buccal mucosa, the upper alveolar process and the palate. Finally, he should take note of the tonsillar region.

In addition to examining the mouth, the dentist should observe the lips. The precancerous lesion of the lip, as in the mouth, is leukoplakia. Early lip cancer is a small ulceration which does not heal. It may resemble an ulceration from herpes simplex, or it may look like a tear from a cigarette adhering to the lip. Crusts may cover the lesion.

TREATMENT

Treatment of malignant tumors of the mouth needs the combined skill of the dentist and the physician. The dentist is the detective and the physician the prosecutor, and they should consult with each other.

A broad rule followed in the treatment of mouth cancer is to remove operable infiltrating lesions by surgery and to irradiate outwardly proliferating growths and tumors of grades 3 and 4.

While treatment is being planned, the dentist should clean the mouth. All infected teeth and those of questionable vitality should be removed. If irradiation is to be given, all teeth which will be directly in the roentgen ray beam should be extracted. Such dental care will lessen the incidence of postradiation osteomyelitis. Postradiation osteomyelitis may also be avoided by the use of intraoral roentgen therapy which obviates irradiating through the mandible. With the intraoral method, the x-ray cone is placed in the mouth and positioned on the lesion. If difficulty is encountered in inserting the proper sized cone in the mouth, obstructing teeth, even though healthy, should be extracted.

Radium is used when the lesion cannot be covered by an intraoral cone or when intraoral x-ray equipment is not available.

The treatment for leukoplakia is both medical and dental. A serological test should be made to rule out syphilis. If ulceration is present, a biopsy specimen should be taken to rule out malignancy. While awaiting the results of the tests, the mouth should be cleaned, irritants removed, smoking forbidden and large doses of vitamin B given. All metallic fillings in the mouth should be of one type. If the leukoplakia persists and is not too diffuse, the patch may be fulgurated or peeled off with a scalpel. Recurrence is common, and periodic check ups must be maintained.

EDUCATION OF DENTIST AND PHYSICIAN

For most physicians and dentists the detection of early cancer is difficult because they have not seen these early lesions in school or in their practices. Unfortunately, cancer teaching has been inadequate and there has been insufficient emphasis placed on the recognition of early lesions. Open any cancer or oral surgery textbook and turn to "Carcinoma of the Tongue" and you will see photographs of large, ulcerating lesions. Similarly, photographs are shown of "interesting" cases of advanced carcinoma in other sites of the mouth. Early lesions, difficult to photograph and also less spectacular, are seldom reproduced. This attention to advanced cancer gives a wrong impression of the disease.

Fig. 5 • Model of head showing cancer of the tongue

To see and to palpate early cancer is the ideal method of teaching. This method, however, is seldom used since few patients with early lesions are available for demonstration purposes. Even when patients with early cancer are available, it would be unwise not to treat them immediately.

The best alternative, therefore, is to simulate the lesion. To do this various parts of the body were constructed in clay for final translation into latex.[2] These models, life-sized and fully colored, permit palpation (Fig. 5). Examples of early

2. Goldman, Leonard B., and Beiskie, Abram, Cancer teaching models (permitting palpation). Am. J. Surg. 77:402 (March) 1949.

cancer are superimposed on these models which may be examined in the same manner as a patient. In addition to their use in cancer teaching, operative procedures, regional anesthesia, implantation of radium, and dental malformations may be shown on the models.

These models are easy to duplicate once the original has been completed and should be used as supplements to the standard textbooks.

SUMMARY

Early intraoral cancer is a small ulcerated lesion. The definitive step in diagnosing early oral cancer is immediate biopsy of every red ulceration. The sponge biopsy technic is a new procedure which gives no inconvenience to the patient.

Life-sized teaching models which approximate tissue consistency are described.

The following guide for preventing and detecting early cancer is recommended:

1. Look for and remove the predisposing factors of mouth cancer.
2. Detect leukoplakia.
3. Detect and suspect every ulceration.
4. Biopsy every red ulceration.
5. Refer the patient immediately for medical care.
6. Verify the referral.

80-20 Broadway

An analysis of the developing dentition

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In 1946 Hays Nance[1] presented convincing evidence that the usual orthodontic expansion in width and length of arches of many mixed dentition cases was wasted effort. Nance found that the sum of the mesiodistal widths of the deciduous mandibular cuspids and molars usually exceeded that of the succeeding permanent teeth. This difference varied from zero to as much as 8 mm. Even though the permanent mandibular incisors may be rotated or crowded, this extra space was often enough to align correctly all permanent mandibular teeth anterior to the permanent mandibular first molars without resorting to increase in width and length of the arch. After all retainers had been removed Nance found he had obtained a maximum increase in arch length of 2.6 mm. in one case only and warned that a permanent increase of 1.9 mm. represents all that one can hope to obtain by buccal expansion alone.

Nance stated, "In certain other cases he may order removal of the mandibular deciduous canines and do nothing more." Labial movement of lingually locked mandibular lateral incisors, favorable rotations, and betterment of the median line may follow this extraction (Fig. 1). Contrary to general opinion Nance asserted,

> In the event there is insufficient room for premolars, canines and incisors, plus about 1.7

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1. Nance, Hays N., The limitations of orthodontic treatment. I. Mixed dentition diagnosis and treatment. Am. J. Orthodontics 33:177 (April) 1947.

mm. on each side for eventual forward positioning of first permanent molars, there is nothing to be gained by attempting to hold this deficient arch length until all the permanent teeth have replaced all deciduous teeth. On the other hand, if the above requirements are met, then this favorable situation will be maintained by the deciduous teeth themselves, so long as sufficient root structure of the mandibular second deciduous molars remains to restrain first permanent molars. Clinical observations have shown, that when these teeth have been retained sufficiently long with adequate roots, they provide an effective barrier to mesial migration of first permanent molars, even in the absence of first deciduous molars.

The lingual arch, used to keep mandibular first molars from moving mesially, is limited to those cases which have sufficient arch length. Nance advised removal of deciduous second molars and placement of the lingual arch when "the roots of the mandibular second deciduous molars are nearly gone or until canines or first premolars need space."

Does this mean that pedodontists have wasted much effort in saving carious or devitalized deciduous mandibular cuspids and first molars to serve as space retainers? Does this mean space retainers are not needed in these places? Why did Nance[1] limit this preventive measure of extracting deciduous mandibular cuspids to Class I (Angle[2] classification) cases that have sufficient arch length? If this extraction allows normal positioning of mandibular incisors over basal bone without orthodontic appliances, why can't the

2. Angle, E. H., Treatment of Malocclusion of the Teeth, ed. 7. Philadelphia: S. S. White Dental Mfg. Co., 1907.

Fig. 1 • Model on lower left shows self-improvement following removal of deciduous mandibular cuspids shown in original model on lower right. Note labial movement of mandibular lateral incisors toward normal positions

pedodontist extract deciduous mandibular cuspids in all cases of crowded permanent mandibular incisors? He could thus practice a very simple form of preventive orthodontics and help both patient and orthodontist.

Answers to some of these questions may be found in a study started in April 1946 at the College of Dentistry, University of California, under the direction of Wendell L. Wylie, head of the division of orthodontics. Deciduous mandibular cuspids were extracted in mixed dentition cases that were not under active treatment but had crowded or rotated mandibular incisors. This extraction was performed after models of the dentures, intraoral roentgenograms and cephalometric roentgenograms had been made. Ectopic eruption of permanent mandibular lateral incisors had caused premature loss of deciduous mandibular cuspids in some of these cases. To date of writing similar progress records of 36 cases have been made at average intervals of a year and a half.

Modified Nance[1] measurements were made to compare space available in the mixed dentition mandible with the space needed by the 10 permanent teeth anterior to the permanent mandibular first molars. Space available is measured on the model of the lower denture by measuring the mesiodistal widths of the unrotated teeth which are over basal bone anterior to the permanent mandibular first molars, and adding to these the widths of any spaces, plus the widths of spaces occupied by rotated teeth; not the mesiodistal widths of rotated teeth. This is done with fine pointed draftsman's dividers. The width of a tooth or space is transferred onto paper so that each measurement is on the same straight line with one point of the dividers entering a hole made by the measurement of the adjacent tooth or space (Fig. 2). The sum of these widths represents the mixed dentition arch length and is measured in millimeters. From this sum is subtracted 3.4 mm., because Nance[1] found each permanent mandibular first molar drifts mesially 1.7 mm. in the transition from mixed to permanent dentition. This remainder is the space that will be available for the 10 mandibular permanent teeth anterior to the permanent mandibular first molars.

The space needed is determined in a like manner except the mesiodistal width of each erupted permanent mandibular incisor and not the space it occupies is added to the mesiodistal widths of the unerupted permanent cuspids and bicuspids as measured in the intraoral roentgenograms. Because roentgenograms produce enlarged images of unerupted teeth and many roentgenograms are distorted, Ballard and Wylie[3] developed a formula, originated by C. W. Carey of Palo Alto, California, in which the sum of the mesiodistal widths of unerupted permanent mandibular cuspids and bicuspids on each side is predicted from the sum of the mesiodistal widths of the 4 permanent mandibular incisors (Fig. 3). Ballard and Wylie[3] found the formula had an average error of 2.5 per cent or 0.6 mm. for each side, compared with an average error of 10.5 per cent or 2.2 mm. on each side from roentgenogram measurements.

Subtracting the space needed as determined from roentgenograms or formula from the remainder of space available gives a discrepancy expressed as minus so many millimeters if there is not enough bone to support these permanent mandibular teeth in good alignment over basal bone. If there is enough space the difference will be expressed as zero leeway or plus so many millimeters leeway. These measurements can be used as an aid in determining the need for extraction of permanent teeth in the final orthodontic treatment of a case.

A wide difference was noted in the

3. Ballard, Murray L., and Wylie, Wendell L., Mixed dentition case analysis—estimating size of unerupted permanent teeth. Am. J. Orthodontics 33:754 (Nov.) 1947.

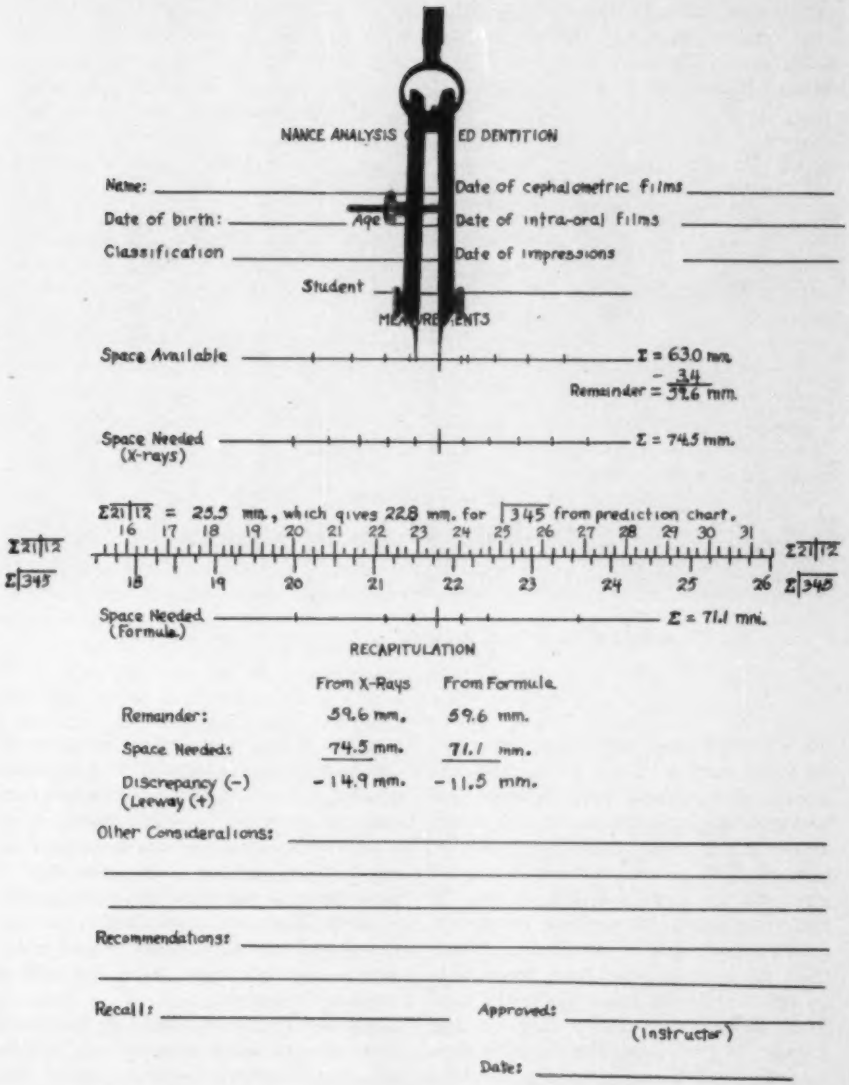

Fig. 2 • Shows transfer of mesiodistal measurements with dividers on Nance analysis form used at the University of California College of Dentistry. These measurements are from the original model shown in Figure 1. The scale in the center is the horizontal form of the Ballard-Wylie formula

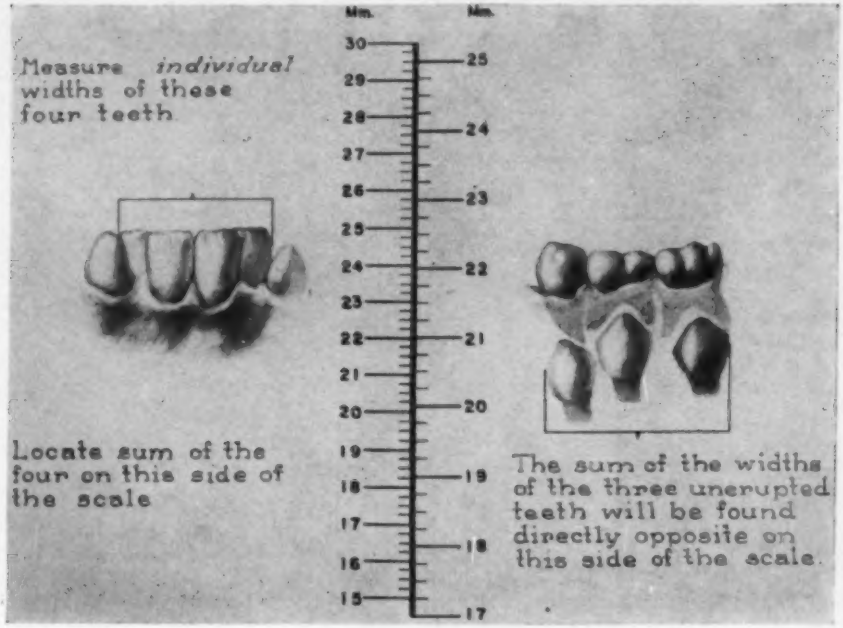

Fig. 3 • Ballard-Wylie formula expressed in the form of a vertical scale

space needed by all permanent mandibular teeth anterior to the permanent first molars as measured from models and roentgenograms as compared with measurements computed by the Ballard-Wylie[3] formula. The greatest difference was 9.0 mm. and the average difference was 2.6 mm. The measurements from roentgenograms were larger by more than 1.0 mm. than the measurement from formula in 64 per cent of the cases, within 1.0 mm. in 28 per cent and smaller by more than 1.0 mm. in 8 per cent. Thus in using these measurements to determine the need for extraction of permanent teeth in the orthodontic treatment of a case, the measurement by formula would be more conservative in most cases. The discrepancy by roentgenogram measurements was 9.0 mm. greater than the discrepancy by formula in one case. On the other hand the discrepancy by formula was 3.0 mm. greater than that from roentgenogram measurements in another case. This should be a warning to check one method against the other in each case until a more accurate means of predetermination is made. The cases in this study have not developed enough to check the predetermined measurements with the actual teeth after eruption.

Of the 36 cases studied, 21, or 58 per cent, showed what appeared to be definite improvement or lessening of the degree of malocclusion when viewing the before and after models. One appeared to be worse where erupting permanent mandibular cuspids caused more crowding of permanent mandibular incisors. The changes apparent on the models were

labial or lingual movement of permanent mandibular incisors, lateral movement of these teeth away from the median sagittal plane toward normal positions, favorable changes in the midline of the permanent mandibular teeth and cessation of gum recession on the labial of permanent mandibular incisors.

In considering what influence lingual arches had on improvement, it was found that only one third of the improved cases had lingual arches while more than half of the cases that failed to improve had similar appliances.

Considering the age at time of extraction of deciduous mandibular cuspids, in the improved group two-thirds were under 9 years of age with an average age of 8 years, 5 months. In the unimproved group two-thirds were over 9 years of age with an average age of 9 years, 3 months. Eruption of permanent mandibular cuspids shortly after extraction of deciduous mandibular cuspids does not allow enough time for self-improvement of irregular mandibular permanent incisors.

Very little correlation was noted between the degree of discrepancy in space needed and the improvement noted. The improved cases averaged minus 6.2 mm., the unimproved, minus 6.9 mm., using roentgenogram measurements. Using the Ballard-Wylie[3] formula the improved cases averaged minus 4.1 mm.; the unimproved, minus 4.9 mm.

Using Angle's[2] classification of malocclusion, 20 of the 36 cases were Class I, 11 were Class II division 1; and 5 were Class II division 2.

Changes in position of the permanent mandibular first molars and incisors were measured on tracings of the cephalometric roentgenograms by means of a base line drawn tangent to the lower border of the mandible. From this base line a vertical line was drawn to the occlusal surface of the molar tangent to its distal surface, another to the incisal edge of the most anterior incisor and a third tangent to the most anterior point of the mandible. The intersection of this latter on the base line provided a point on the base line from which to measure horizontal change. Vertical change was measured along the lines vertical to the base line (Fig. 4).

Only one case showed any increment of bone at the most anterior point of the mandible when the before and after tracings were superpositioned so that the lower border of the mandible and the center of a cross section of the mandible at the symphysis coincided. This patient was 10 years, 3 months of age. Correction was made for this increment. Although only 5 cases have a third set of records at this writing 2 of these 5 cases show in-

Fig. 4 • Changes in positions of permanent mandibular first molars and the most anterior incisor were measured on the tracings of the serial cephalometric roentgenograms as follows: horizontal position of molar = M'–P' along base line B–L; of incisor = A'–P'; vertical position of molar = M–M'; of incisor = A–A'

crement of bone at the most anterior point of the mandible. These latter patients are 12 years, 7 months of age; and 13 years, 4 months of age.

The question of mesial movement of permanent mandibular first molars following extraction of deciduous mandibular cuspids could be determined with any degree of accuracy from tracings of the cephalometric roentgenograms only. To eliminate any possible tooth movement owing to appliances, only those cases with deciduous mandibular second molars present without either upper or lower appliances were considered for this measurement. Of 17 cases falling in this category, 7 showed no horizontal change of permanent mandibular first molars on the tracings, 7 showed apparent distal movement averaging 0.4 mm., and 3 showed apparent mesial movement averaging 0.4 mm. The apparent mesial and distal movement averages of 0.4 mm. being equal is a clue that leads to the following possible explanation. The soft tissue and cartilage lining the auditory canals may permit slight rotation in a horizontal plane of the patient's head against the ear rods of the cephalometer. This would produce a different projected image on the film. Considering these facts it is probably safe to say that no mesial movement of permanent mandibular first molars takes place because of extraction of deciduous mandibular cuspids.

No mesial movement of permanent mandibular first molars occurred in the 6 cases in which the deciduous mandibular first molars were extracted simultaneously with the deciduous mandibular cuspids. However, the ages of these patients averaged 9 years, 8 months when normal shedding of deciduous mandibular first molars could be expected.

Without cephalometric roentgenograms any movement of permanent mandibular first molars may be measured by relations with the permanent mandibular incisors or with the maxillary molars. If permanent mandibular incisors change position after extraction of deciduous mandibular cuspids the maxillary molars serve as a point from which to measure change in mandibular molars. After discarding 2 cases in which "convenience" bites were evident because of crossbite relation of molars and one in which a maxillary molar was intentionally moved distally it was found that this maxillary to mandibular molar relation had changed in 10 cases. In 7 of these 10 cases the deciduous mandibular second molar had been exfoliated and the permanent mandibular first molars had moved mesially within the 1.7 mm. range of which Nance[3] spoke.

In each of the other 3 cases the permanent mandibular first molars had moved mesially 2.0 mm. in relation to the maxillary molars even though the deciduous mandibular second molars were present. Superpositioning of the mandibles in the before and after tracings of each case showed no mesial movement of the permanent mandibular first molar through the mandible. The remaining explanation is that the mandibles moved forward in their relations to the skull to a new centric position. Tracings of the gnathion at centric and rest in the first set of tracings showed that measured from the head of the condyle the gnathion moved forward in 88 per cent of all the cases; 0.6 mm. in one of the 3 cases, 0.7 in another and 3.7 mm. in the third. Thus the so-called "unlocking of the bite" could not be predicted from these tracings. It is possible that extraction of deciduous mandibular cuspids may release a "locked bite" and permit the mandible to take a more forward centric position (Fig. 5). This demonstrates the unreliability of maxillary to mandibular molar relations in measuring movement of teeth within bone. It also makes one wonder if this 8 per cent of mixed dentition cases are "unlocked" when mandibular cuspids are shed normally.

The labial and lingual movements of the permanent mandibular incisors were

Fig. 5 • "Unlocked" bite case. Model on left is before extraction of deciduous mandibular cuspids. Note distal relation of lower molars. Model on right after extraction shows normal relation of molars resulting from mesial movement of mandible to new centric position

measured on the models at right angles to a straight edge laid across the buccal groove of the permanent mandibular first molars. Correction was made in each case for the mesial or distal movement of the permanent mandibular first molars as determined in the tracings.

Fifty-one per cent of the permanent mandibular central incisors moved lingually an average of 1.7 mm., the greatest lingual movement being 4.5 mm. Nineteen per cent of the central incisors moved labially an average of 0.9 mm., the greatest labial movement being 1.5 mm.

Fifty-one per cent of the permanent mandibular lateral incisors moved lingually an average of 1.7 mm., the greatest lingual movement being 5.0 mm. Thirty per cent of the lateral incisors moved labially an average of 1.7 mm., the greatest labial movement being 4.0 mm. All 4 mandibular permanent incisors moved lingually in 28 per cent of the cases. All 4 moved labially in 8 per cent of the cases.

Nance[1] recognized this lingual movement and said, "When deciduous canines are prematurely lost, mandibular incisors are seemingly positioned lingually by lip pressure, so that it is possible later to move them somewhat labially without relapse."

In 2 cases where the labial gum was receding from permanent mandibular incisors, this gum recession ceased and made a 1.0 mm. return incisally after extraction of deciduous mandibular cuspids. Although no lingual movement of these particular incisors was noted, removal of pressure caused by crowding probably was responsible for this improvement.

In determining if the lingual arches used in 16 cases had much effect on the labial or lingual movement of incisors it was found that 47 per cent of the cases which showed lingual movement of permanent mandibular incisors had lingual arches. Forty-seven per cent of the cases that showed labial movement had no lingual arches. The lingual arches were designed to be passive and in only 6 cases were they placed within 5 months after

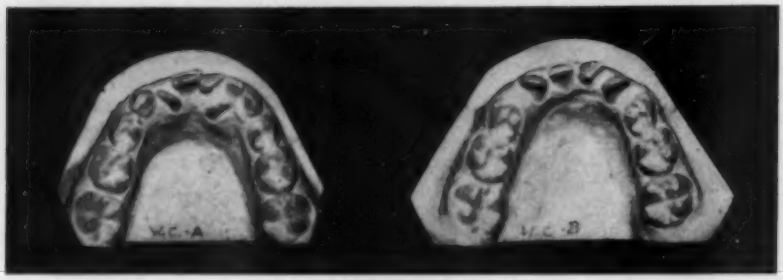

Fig. 6 • Model on left is before extraction of deciduous mandibular cuspids. Model on right is after extraction. In moving toward normal positions the distance between the distal of each lateral incisor increased 7.1 mm.

extraction of the deciduous mandibular cuspids. Thus most change apparently took place before the lingual arches were placed.

Incomplete root formation of the most anterior mandibular tooth in the first set of tracings made it impossible to determine angular changes with any degree of accuracy. Of the 16 cases with lingual arches labial tipping could be demonstrated in 5 cases with an average labial tipping of 4.9 degrees. Two of these 16 cases showed lingual tipping which could have occurred before the arches were placed or because of arches that did not touch the most anterior mandibular tooth.

Of the 20 cases without appliances, 3 tipped lingually an average of 2.7 degrees and 3 tipped labially an average of 7.8 degrees. No tipping could be demonstrated on the tracings of the other 14 cases. A permanent mandibular central incisor, with an average over-all length of 20.7 mm. (Black's[4] averages), tipping with its apex as a fulcrum would have to move through an arc of about 3 degrees for the incisal edge to move 1.0 mm. These angular changes do not appear significant enough to determine if labial or lingual movement was bodily movement or simple tipping.

In 17 cases the permanent mandibular central incisors needed rotation. There was some improvement in 29 per cent of these cases. One was worse owing to eruption of mandibular permanent cuspids crowding the mandibular incisor teeth. In 17 cases the mandibular lateral incisors needed rotation. There was some improvement in 47 per cent of these cases.

In 28 per cent of the cases spaces appeared between the permanent mandibular incisors before the permanent mandibular cuspids erupted. The permanent mandibular cuspids had erupted in 15 cases and in only one of these were there spaces between the mandibular incisors. In this case the permanent mandibular right lateral incisor remained far lingual to the line of occlusion.

The measurement between the distal surfaces of the permanent mandibular central incisors increased in 36 per cent of the cases. This average increase was 0.7 mm., with a maximum of 1.2 mm. This measurement decreased an average of 0.5 mm. in 11 per cent of the cases with a maximum decrease of 0.8 mm. The mandibular cuspids were erupted in all of the cases that showed a decrease. The measurement between the distal surface of the permanent mandibular lateral

4. Black, G. V., Descriptive Anatomy of the Human Teeth, ed. 4. Philadelphia: S. S. White Dental Mfg. Co., 1902.

incisors increased in 55 per cent of the cases. This average increase was 2.5 mm. with a maximum increase of 7.1 mm. (Fig. 6). It decreased an average of 1.0 mm. in 14 per cent of the cases with a maximum decrease of 2.0 mm. in 1 case. The permanent mandibular cuspids were erupted in all of the cases that showed a decrease in this measurement of permanent mandibular lateral incisors (Fig. 7).

The midline of the mandibular incisors was off center in 10 cases. Four cases improved; six did not. The maximum movement of permanent mandibular incisor midline was 4.0 mm. In 5 of the 10 cases a deciduous mandibular cuspid had been lost prematurely because of ectopic eruption of mandibular lateral incisors. Of these 5 cases the midline of the permanent mandibular incisors improved in 3 cases and did not change in the other 2 cases.

In the second set of mandibular models the permanent mandibular incisors appeared to be extruded above the occlusal plane (Fig. 8). Absence of one or more deciduous teeth and failure of their successors to erupt between the permanent mandibular first molar and permanent mandibular incisors in many of the second set of models and tracings made it difficult to establish an occlusal plane. Measured on the serial tracings the distance between the base line tangent to the lower border of the mandible and the occlusal surface of the permanent mandibular first molar showed an increase as did the distance between the incisal edge of the most anterior permanent mandibular incisor and this same base line. Carl-

Fig. 7 • Upper model is before extraction of deciduous mandibular cuspids. Model on lower left after extraction shows self-improvement by labial movement of lateral incisors. Model on lower right shows partial relapse after eruption of permanent mandibular cuspids

Fig. 8 • Model on left is before extraction of deciduous mandibular cuspids. Model on right after extraction shows extrusion of the incisors above the occlusal plane

son[5] states, "In most of the teeth the period of rapid eruption continued until the tooth came into occlusion when there was a sudden slowing down. From this time on the tooth erupted only as rapidly as the occlusal plane arose." Carlson's[5] findings and Brodie's[6] "constancy of the pattern" would lead one to expect equal vertical movement of anterior and posterior mandibular teeth after coming into occlusion. Carlson[7] cautioned against using the occlusal plane in a mixed dentition as a basis from which to make an accurate measurement.

In 61 per cent of the cases the most anterior permanent mandibular incisor erupted a greater amount than did the mandibular molar of the same case. This was measured along a line at right angles to the base line tangent to the lower border of the mandible. The average increase in this eruption of the most anterior mandibular incisor was 1.0 mm. more than that of the molar, the greatest difference being 2.8 mm. There was a decrease of 22 per cent in mandibular incisor eruption compared with the mandibular molar eruption. In 17 per cent the eruption of incisor and molar was equal. Sixty-three per cent of the cases that showed a decreased rate of eruption of the most anterior permanent mandibular incisor had lingual arches that may have retarded this eruption. The 4 permanent mandibular incisors of each case appeared to be on the same occlusal plane in the second set of models. This extrusion above the occlusal plane would thus apply to the 4 permanent mandibular incisors in each case that showed extrusion of the most anterior mandibular incisor in the tracings.

SUMMARY

Thirty-six mixed dentition cases with crowded mandibular anterior teeth provided the material for this study in this preliminary report. Models, intraoral roentgenograms and cephalometric roentgenograms were taken before extraction of deciduous mandibular cuspids. A second set of similar records were made an average of a year and a half later. Discrepancies between space available and space needed by all permanent mandibular teeth anterior to the permanent mandibular first molars were determined from models, intraoral roentgenograms and Ballard-Wylie formula. Change in position of the permanent mandibular first molars and permanent mandibular incisors was noted. The effect of lingual arches used in 16 of these cases was also taken into account.

CONCLUSIONS

1. Self-improvement or reduction of the degree of malocclusion occurred after premature loss of deciduous mandibular cus-

5. Carlson, Harry, Studies on the rate and amount of eruption of certain human teeth. Am. J. Orthodontics 30:575 (Nov.) 1944.

6. Brodie, A. G., On the growth pattern of the human head, from the third month to the eighth year of life. Am. J. Anat. 68:209 (March) 1941.

7. Carlson, Harry, Personal communication, 1949.

pids in 58 per cent of mixed dentition cases with crowded mandibular anterior teeth.

2. Premature loss of deciduous mandibular cuspids did not affect the position of erupted permanent mandibular first molars.

3. Lingual movement of permanent mandibular incisors, central or lateral or both, occurred in 51 per cent of these cases.

4. Extrusion of the permanent mandibular incisors averaging 1.0 mm. occurred in 61 per cent of these cases.

5. Carefully fitted lingual arches placed immediately after the extraction will do much to counteract this lingual extrusion movement.

6. Before extracting deciduous mandibular cuspids as a preventive measure the pedodontist and orthodontist should weigh the desirable movement against the undesirable movement that can be expected.

7. Because roentgenograms produce enlarged images of unerupted teeth and the mathematical formula may vary either way, the orthodontist should compare one measurement with the other when predicting space needed for unerupted mandibular cuspids and bicuspids.

8. If deciduous mandibular cuspids have been lost prematurely more than three months previous to measuring space available the latter measurement may have been reduced by lingual movement of permanent mandibular incisors.

9. Forward movement of the mandible to a new centric position occurred in 8 per cent of the cases with premature loss of deciduous mandibular cuspids. If this were judged from maxillary to mandibular molar relation alone, it could easily be misinterpreted as mesial movement of mandibular posterior teeth through alveolar bone of the mandible.

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Emotional Factors in Dentistry • An example of a dental problem in which emotional factors play a part is the patient one encounters occasionally who never feels that his dentures fit properly or comfortably. He goes from dentist to dentist in a vain attempt to get a better "fit," collecting on the way many spare dentures. On psychiatric investigation some of these patients turn out to be "oral characters" whose oral needs have never really been satisfied in childhood and who, as adults, use the oral cavity for vicarious gratification when under strain. The "fit" they are seeking may lie in another direction altogether and then dentures represent a displacement of their wishes. While the psychodynamics involved in such cases are very complex indeed, they are mentioned as examples only because this type of patient is often met. *Bernard B. Raginsky, "Some Psychosomatic Aspects of General Anesthesia," Anesthesiology 11:400, July 1950.*

Chemical studies in periodontal disease VII. Correlation of blood glucose tolerance and tissue glycogen concentration in periodontal disease

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The voluminous literature regarding the etiology of periodontal disease shows no known uniform cause. The pathogenesis[1] appears to be different in nearly every case; and the disease is thought to develop as the result of certain oral as well as systemic conditions. One widely accepted hypothesis is that there is a systemic predisposition which, when present, allows oral factors to precipitate the disease. Breuer[2,3,4] goes so far as to say that all periodontal disturbances are manifestations of systemic disease and that, therefore, periodontal disturbances afford diagnostic criteria for the detection of systemic dysfunction long before other clinical manifestations are apparent.

Recent investigations have suggested that abnormal metabolism in the tissue may be involved. The fact that periodontal diseases are always associated with the degradation of proteins suggests that the condition may be basically a proteolytic or a putrefactive process.[5,6,7] It is a common clinical finding that chronic periodontal disease and caries are generally antagonistic. It has been shown[8] that fermentable carbohydrates retained in the mouth are the source of acids which are primarily responsible for the decalcification of the teeth. When there is as little as 0.5 per cent glucose in the saliva, little or no putrefaction of the salivary proteins occurs until all of the sugar has

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The opinions and assertions contained in this article are the private opinions or assertions of the authors and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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5. Law, D. B.; Berg, M., and Fosdick, L. S., Chemical studies in periodontal disease—I. J. D. Res. 22:373 (Oct.) 1943.

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8. Fosdick, L. S., Correlation of some facts concerning the aetiology and control of dental caries. J. Canad. D. A. 9:359 (Aug.) 1943.

been utilized by the acidogenic bacteria.[9] This indicates that the destruction of proteins in the saliva is inhibited when there are fermentable carbohydrates being metabolized. Evidence indicating decreased phosphatase activity in periodontal cases has been shown.[10,11] This evidence indicates that the rate of carbohydrate metabolism in gingival tissue may be less than normal in periodontal cases. There is no significant difference in glucose concentration between finger blood and gingival blood in cases of periodontal disease,[12] but, according to Berg and others,[13] there is a significant decrease in glycogen concentration of traumatized gingival tissue and of tissue affected by periodontal disease.

The known fact that good glycogen stores are present in healthy tissue and that the glycogen levels are consistently low in systemic diseases,[14,15,16] dietary imbalance,[17,18,19] and in fatigued muscle[20,21,22] fits into the accepted hypothesis[22,23] that, in the absence of glycogen and fat for fuel, there will be a shift of the dynamic equilibrium to the catabolic side so that the protein may be used as a substitute source of fuel. Furthermore, Richardson[24] has shown that glycogen inhibits proteolytic action in the tissues, while certain amino acids derived from proteolytic action will accelerate putrefaction. On the basis of these systemic correlations, it is plausible to infer that a number of putrefactive processes in the oral tissues may be associated with decreased glycogen metabolism in those tissues. This would explain the putrefaction of salivary proteins in the absence of fermentable carbohydrates,[9] the alkaline reaction of nonhealing tooth sockets,[19] the decreased phosphatase activity in periodontal disease cases,[10,25] the reported decrease in glycogen concentration in the gingival tissues of periodontal cases,[13] and the decreased gingival glycogen concentration in experimental alloxan diabetes.[26]

All of these experimental facts are compatible and substantiate the theory that chronic periodontal disease is a process of putrefaction of gingival proteins as a result of the substitution of protein for fuel instead of tissue glycogen, which normally supplies that function. The etiology of this failure of adequate glycogen for fuel might be any of many processes. The similar glucose concentration in finger blood and gingival blood in periodontal cases[12] indicates that there is

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no failure of supply of glucose which is the source of tissue glycogen. Hence, one must conclude that the reason for the deficiency of glycogen is either failure of the mechanisms which convert blood glucose to tissue glycogen or factors which destroy the tissue glycogen before it can serve its function.

The blood glucose level at any static point indicates the balance between production and utilization of blood glucose. From this premise it follows that altered tissue glycogen concentration may be reflected in the blood glucose tolerance curve. Such findings are recorded in the literature. That altered carbohydrate metabolism is reflected in both altered tissue glycogen concentration and altered blood glucose tolerance curves has been shown experimentally with poor carbohydrate diets,[19] insulin, epinephrine, elimination of hepatic circulation, phlorizin, heat, ice, roentgen rays,[16] hypophysectomy[27] and alloxan diabetes.[26] It then follows that if the decreased gingival glycogen found in periodontal cases is caused by altered carbohydrate metabolism it should have a tendency to be reflected in the blood glucose tolerance curve. Such a correlation would suggest that some imbalance or malfunction of one of the endocrines, or some combination of them, or imbalance or malfunction of the carbohydrate-splitting enzymes, or an imbalance of endocrines and carbohydrate-splitting enzymes, might be responsible for the altered gingival glycogen concentration in periodontal disease. Although this would offer no clue as to which endocrine or enzyme activity is responsible, it would show a relation between the systemic dysfunctions which appear clinically to be factors in the causation of the periodontal disease.

Besides these systemic factors, the literature reveals that there are several other factors which will alter the glycogen concentration in a tissue. Bomskov and Kaulla,[28] as well as Gutmann,[29] pointed out that a great deal of the inconsistency in experimental results might be caused by the method of handling the tissue prior to analysis. Both trauma and bleeding will cause rapid hydrolysis of the glycogen, and hence all tissue samples must be excised rapidly with a sharp instrument and immediately analyzed. Berg[13] pointed out that, in the case of the oral tissues, it also is important that the procedure used should eliminate saliva from the tissue prior to excision, since most salivas hydrolyze glycogen rapidly.

Thus, it becomes apparent that the glycogen concentration of the gingival tissues may vary either because of systemic dysfunction of carbohydrate metabolism or because of trauma. If the periodontal disease is caused by oral factors, then the altered gingival glycogen concentration probably is produced by trauma. On the other hand, if the periodontal disease is caused by systemic dysfunction, then the altered tissue glycogen concentration might be associated with altered blood glucose tolerance.

This study has been made in an attempt to determine whether there is any correlation between the tissue glycogen concentration, glucose tolerance and periodontal conditions.

PROCEDURE

Forty-one cases of chronic periodontal disease were studied to determine the glycogen content of the gingiva and the blood sugar tolerance. These determinations were compared with the results of

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29. Gutmann, M., A Study of Glycogen Formation in the Liver of the Guinea Pig as Influenced by Ascorbic Acid. I. Factors Influencing the Estimation of Liver Glycogen. Thesis. Northwestern University Medical School, Chicago, 1941.

the same tests performed on individuals with normal gingival conditions.

In the selection of subjects only one criterion was used: they had observable periodontal disease. Normal cases used for comparison were selected with the one criterion of having optimum gingival health. The pathologic cases used all showed an advanced condition of periodontal disease with pockets at least 4 mm. deep and marked bone resorption. Since the condition of the tissues in these advanced cases could not be differentiated, no attempt was made to classify the pathologic cases as to etiology or otherwise.

To minimize the loss of tissue glycogen caused by clinical factors, the following precautions were taken:

1. The patient was advised not to brush his teeth but merely to rinse his mouth well on the morning of the test.

2. If necessary, the area to be operated on was gently swabbed and rinsed again.

3. Block anesthesia was used to keep the anesthetic solution and its epinephrine out of the tissues to be analyzed.

4. The area to be operated on was isolated with cotton rolls and well dried with compressed air.

5. Especially sharpened Merrifield knives were used to excise one interdental papilla with a minimum of trauma and time.

6. The tissue sample was immediately frozen with dry ice.

Berg[13] had reported relatively consistent concentrations of glycogen in samples as small as 10 mg., but early determinations in this study showed much less deviation if the samples were considerably larger. Since one interdental papilla weighs about 30 mg. and since the whole papilla was relatively easy to take, samples of this size were used.

The method of analysis for glycogen content of tissue was that used by Berg up to the point where the precipitated glycogen had been digested in acid solution. From this point on, the Farmer-Rupe method[30] was used.

The sample of hydrolyzed glycogen was placed in a 25 cc. volumetric flask and made alkaline to phenolphthalein indicator with normal sodium hydroxide. One cubic centimeter of copper reagent was then added to the alkaline glucose solution. The solution was then heated in a steam bath for 10 minutes to reduce the copper. (If the solution turns bright red, more copper reagent should be added to make the solution a slight purple.) The solution was then cooled under the tap. Five cubic centimeters of the molybdate reagent was added. (If more than 1 cc. of copper reagent is used, 10 cc. of molybdate reagent is added.) The solutions were then well mixed and diluted to 25 cc. with distilled water. The phosphomolybdate is oxidized to form the characteristic blue color. After five minutes the transmission of the light was read on a spectrophotometer using a wave length of 725μ and a red filter PC_5. The amount of glycogen or sugar was read from the respective standard curve which had been previously prepared. A reagent blank was determined simultaneously with the determination for the sample.

For the blood glucose determinations, 0.1 cc. of finger-prick blood was accurately measured and transferred to 2 cc. of water in a micro test tube. After the blood was laked, it was deproteinized with 0.2 cc. of 7 per cent copper sulphate and 0.2 cc. 10 per cent sodium tungstate solution. The samples were centrifuged and the supernatant liquid was filtered through a small Buchner funnel. (If no funnel is available, the clear supernatant fluid may be withdrawn by suction.) One cubic centimeter of the clear supernatant fluid was then placed in a 25 cc. volu-

30. Farmer, C. J., and Rupe, C. D., Unpublished method of glucose determination, Chemical Department, Northwestern University Medical School, used by the courtesy of the authors.

Table 1 • Glycogen content of gingival tissue

	Normal	Pathologic
Number of subjects	16	38
Mean glycogen content	0.19 mg. %	0.34 mg. %
Standard deviation	0.102	0.074
Coefficient of variation	53.7 %	21.7 %
Range with 95 per cent confidence	0—0.407	0.19—0.49
Per cent within range	100 %	80 %

Standard error of difference between means, 0.02567.
t ratio, 5.84.
Significant—yes.

metric flask and the sample analyzed for glucose as previously described.

For the blood glucose tolerance test, the blood was taken in the early morning after the patients had had a 12-hour fast. The intravenous injection method was used and finger-prick blood was taken for microanalysis.

After two 0.1 cc. samples of the fasting blood had been taken and the patient's fasting blood glucose level had been determined to be within safe limits, 50 cc. of 50 per cent glucose solution was injected into the median cubital vein. Duplicate samples of finger-prick blood were taken at five consecutive half hour intervals. The duplicate samples for each interval were averaged, and this figure was taken to represent the blood glucose concentration for that period. A blood glucose tolerance curve was then plotted for each patient. Composite curves for the 38 pathologic cases and for the 16 normal individuals were then drawn for comparison with the composite curves of normal individuals reported by Bodansky[31] and by Tunbridge and Allibone.[32] The results of this comparison are shown in Table 1.

RESULTS AND CONCLUSIONS

The mean glycogen content of normal gingivae as found in the study was 0.19 mg. per cent as compared with 0.22 mg. per cent reported by Berg[13] and others. Thus, in these studies the glycogen content of normal tissue in the two studies was essentially the same. On the other hand the pathologic tissue had a significantly higher glycogen content than the normal, while Berg had reported just the opposite, a significantly lower glycogen content. Inasmuch as the original hypothesis concerning the effect of glycogen on periodontal disease was based partially on Berg's reports, it is obvious either that the primary hypothesis was incorrect or that some mechanism is operative that interferes with the normal action of the glycogen.

Repeated checks on the method of analysis and the fact that the glycogen content of the normal tissue was the same in both investigations leave little doubt concerning the accuracy of the analysis. A critical comparison of the technics and methods used indicates that, in this study, the tissues for analysis were obtained under more nearly ideal conditions. The samples of pathologic tissue used in Berg's study were obtained from large samples after routine clinical gingivectomy. Thus, although effort was made to obtain samples as rapidly as possible, considerable time often elapsed between the initial incision and the freezing of the sample. In the present study the sample was frozen within a few seconds after the initial incision. In the

31. Bodansky, M., Introduction to Physiological Chemistry, ed. 4. New York: John Wiley & Sons, Inc., 1938.

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Table 2 • Analysis of glucose tolerance curves

Reporter	Condition	Age	Fasting mg. %	Half-hour peak	Duration of hyperglycemia in hours
Ostrom, Switzer, Fosdick	Pathologic	40	95.0	164.5	1.75
Ostrom, Switzer, Fosdick	Normal	26	90.0	127.5	1.10
Bodansky	Normal	—	78.0	128.0	1.50
Tunbridge, Allibone	Normal	32	80.0	125.0	0.80
Tunbridge, Allibone	Normal	49	120.0	150.0	0.72

former work anesthesia was obtained by infiltration of the tissue with procaine, and hence the tissue was subjected to abnormal environment previous to the operation. In this study only block anesthesia was used. In the former case considerable bleeding occurred, and the blood from the sample was absorbed on paper before the sample was frozen. In this work very little bleeding of the specimens occurred. Thus, it would seem that the differences in glycogen content of the pathologic tissues may be the result of differences in methods of securing the samples.

Another explanation is that the differences may be caused by the type of samples used. In the former work the samples were obtained from relatively large pieces of gingival tissue, while in this study only the interdental papillae were used. Any significant difference of glycogen content of the epithelial tissue as compared with the deeper tissues, was not taken into account in the earlier study. There is no information concerning this point, and there is no information that would indicate that there were any significant differences between the samples in the two investigations except in regard to blood content. Perhaps the high glycogen content of the leukocytes could explain part of the high glycogen content in the later work.

In any event the work shows that pathologic tissue has a significantly higher glycogen content than normal tissue. Thus, if the theory that the normal tissue will utilize glycogen and thus spare the protein is to be of value, there must be some mechanism that prevents the utilization of glycogen in pathologic tissues. Landau[33] found that in diabetes the peripheral tissues appeared to be autonomous and that they even opposed the action of insulin by decreasing their utilization of blood glucose in the face of an induced hypoglycemia. Hence, because of conservation, the pathologic gingival tissue might have more glycogen than normal if periodontal disease is a result of altered carbohydrate metabolism. This, however, is quite unlikely, as it has been definitely shown that in diabetic animals the glycogen content of the gingival tissue is uniformly low.[26]

The composite blood sugar tolerance curve of 16 normal individuals who averaged 26 years of age was essentially the same as that described by Bodansky and as the composite curve of 32-year old normal subjects reported by Tunbridge and Allibone. This comparison is shown in Table 2. Hence, it appears that the normal curve established by this work is valid.

A composite curve from normal subjects who averaged 49 years of age, reported by Tunbridge and Allibone, showed that, with increasing age, there is a higher fasting level, a higher half-hour peak, and a somewhat delayed return to the fasting level (Table 2). These changes with increasing age are common

33. Landau, A.; Hercenberg, T., and Bailess, I., Contribution a l'etude du diabete sucre basee sur les recherches de la glycemie capillaire et veineuse. J. Physiol. Path. Gen. 33:544, 1935.

knowledge but are repeated here for the purpose of comparison with the composite curve of periodontal cases reported in this study.

When compared with the above mentioned normal curves, the composite curve drawn from the forty-one pathologic subjects who averaged 40 years of age showed the following:

1. The fasting level was essentially the same as that of the normal subjects and less than that reported by Tunbridge and Allibone for 49 year old normal subjects. Hence, it appears that the fasting level of these periodontal subjects is essentially normal.

2. The mean half-hour peak was higher than for all of the normal subjects with which it was compared. It was approximately 30 per cent higher than that found for normal individuals in this study, than that reported by Bodansky and than that reported for 32 year olds by Tunbridge and Allibone, and it was 10 per cent higher than that reported for 49 year old normal subjects by Tunbridge and Allibone.

3. The duration of the hyperglycemia was markedly prolonged. Comparison with the normal curve established by this work showed that the return to the fasting level was prolonged by 59 per cent. When compared with the older normal individuals, it was prolonged by 133 per cent.

Whether the theory concerning the glycogen content of the gingivae is correct, there does seem to be a good correlation between uncontrolled diabetes and resistance to healing. Furthermore, the sugar tolerance curves of individuals suffering from advanced periodontitis do seem to be significantly different from those of normal individuals. In general the sugar tolerance curves seem to be higher in older individuals, but the curves for comparable age groups with periodontitis are still higher than those of normal subjects. Thus, it would seem that individuals with subclinical diabetes may be more susceptible to gingival disturbances.

Whether the number of cases used in this investigation is significant is problematic, as these figures are not adaptable to statistical analysis; but they do indicate a trend. More work is progressing along these same lines.

SUMMARY

The glycogen content of gingival tissues of individuals suffering from frank periodontal disease and of normal individuals was determined. There was a significant difference in the glycogen content of these tissues, the pathologic tissue having the higher content. Glucose tolerance was determined on the same individuals. It was found that although the fasting blood sugar of the pathologic cases was within the normal range, the blood sugar levels rose higher and persisted longer than those of the normal individuals.

Cerebral Reception • So many of the disorders of sight and sound to which man is liable have their seat and origin in the purely mechanical parts of the apparatus, ear and eye, that we overlook the truth of cerebral visual and auditory reception, interpretation, and memory, but the fact remains that we see and hear with the brain. *R. J. A. Berry, South African Dental Journal Vol. 23: Nov.-Dec. 1949.*

Penicillin in the prevention of postextraction bacteremia

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An extraction of a tooth is ordinarily one of the simplest procedures in dental practice. Yet this seemingly insignificant operation may occasionally influence the life of the individual. That the extraction of teeth frequently is followed by bacteremia and the development of bacterial endocarditis has now been established both experimentally[1] and clinically.[2-8] Since endocarditis is such a serious infection, the introduction of sulfonamides and antibiotics was followed inevitably by studies to determine their value in the prevention and eradication of this bacteremia. Although sulfonamides apparently decreased the incidence of postextraction bacteremia, many cases of bacterial endocarditis were reported despite premedication with these drugs. In adequate doses penicillin is bactericidal, while sulfonamides are usually only bacteriostatic. Since penicillin was observed to be superior to sulfonamides in the treatment of endocarditis, it seemed advisable to organize a study in which this antibiotic would be employed prophylactically in an attempt to prevent the bacteremia and consequences which follow dental extraction.

METHOD OF STUDY

The patients employed in this study had been admitted to a general hospital for varying types of illnesses and incidentally were in need of dental extraction. Patients with rheumatic or congenital heart disease, or any infectious disease which was likely to be accompanied by bacteremia, were not included in this investigation. Any patient who had received an antibiotic or chemotherapy within the previous 48 hours also was excluded.

There was no selection of patients as to age, color, or sex; nor as to the number of teeth to be extracted, the condition of the mouth or the severity of extraction.

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2. Okell, C. C., and Elliott, S. D., Bacteremia and oral sepsis with special reference to aetiology of subacute endocarditis. Lancet 2:869 (Oct. 19) 1935.

3. Fish, E. W., and MacLean, I., Distribution of oral streptococci in the tissues. Brit. Den. Jnl. 61:336, 1936.

4. Burkat, L. W., and Burn, C. G., Bacteremias following dental extraction: Demonstration of source of bacteremia by means of a non-pathogen (Serratia marcescens). J. D. Res. 16:521, 1937.

5. Elliott, S. D., Bacteremia and oral sepsis. Proc. Roy. Soc. Med. 32:747 (May) 1939.

6. Bartels, H. A., Review of recent literature dealing with transient bacteremias. Am. J. Orthodont. & Oral Surg. 26:366 (April) 1940.

7. Murray, M., and Moosnick, F., Incidence of bacteremia in patients with dental disease. J. Lab. & Clin. Med. 26:801 (Feb.) 1941.

8. Paquin, O. A. Jr., Bacteremia following removal of diseased teeth. J.A.D.A. 28:879 (June) 1941.

In order to determine the significance of the last two factors, the following classifications were established.

The condition of the mouth was classified as follows: (1) no apparent disease, extraction because of simple cavity, (2) moderate dental caries with or without mild gingivitis, (3) severe dental caries, broken-down teeth with or without severe gingivitis, and (4) presence of frank pus, acute abscess, roots, and extreme periodontal disease.

The types of operative procedure were classified as follows: (1) removal of loose teeth, (2) forceps extraction, (3) extractions requiring the use of elevators, and (4) extractions requiring bone surgery.

All extractions were done under local anesthesia using a 2 per cent procaine hydrochloride solution to which epinephrine had been added to provide a dilution of 1:25,000. Feldman and Trace[9] have shown that the use of a local anesthetic causes compression of the blood vessels and lymphatics, and that it minimizes dissemination of any bacteria present. In rabbits, procaine has been shown to increase the bactericidal and phagocytic power of the blood, thus forming a systemic and local barrier to the entrance of organisms into the circulation.[10] The epinephrine, by its vasoconstricting action, has been shown to decrease the possibility of bacteria gaining access to the blood stream.[4] These measures were employed in an effort to minimize the factors contributing to the development of bacteremia.

The type and dose of penicillin and the time of injection in relation to the time of extraction were selected to provide the simplest method of administration for the dentist or physician and at the same time to produce peak concentrations in the blood at the time of extraction and maintain them for a period of time. On the basis of previous work,[11] the dose selected was 600,000 units of penicillin in oil and beeswax (2 cc.) given three to four hours before extraction.

Blood for culture was taken from the antecubital vein immediately, 10 minutes and 30 minutes after extraction. Five to 8 cc. were inoculated in duplicate flasks containing 30 cc. of culture media (Tryptose-phosphate broth-Difco). These were incubated at 37° C., one aerobically and the other anaerobically in a candle jar.

From those patients who had received penicillin, additional blood was taken for determination of the penicillin concentration. The culture media were prepared so as to facilitate the growth of any bacteria present. Penicillinase was added to the culture media used for the patients given penicillin[12] and sodium polyanetholesulfonate (Liquoid-'Roche') in the aerobic cultures.[13, 14, 15] The presence of penicillin and a native antibody may interfere with the growth of bacteria present in the blood under the artificial conditions of culturing, yet be ineffective in the body. It has been shown that penicillinase inactivates penicillin and liquoid interferes with the native antibacterial activity of the blood. Liquoid was not added to the anaerobic culture since Hoare[16] has shown that it is unfavorable

9. Feldman, L., and Trace, I. M., Subacute bacterial endocarditis following removal of teeth or tonsils. Ann. Int. Med. 11:2124 (June) 1938.

10. Vilardo, S., Immunity phenomena in procaine hydrochloride anesthesia. Gior. de batteriol. e immunol. 20:1201 (June) 1938.

11. Hirsh, H. L.; Dowling, H. F.; Vivino, J. J., and Rotman-Kavka G., Penicillin in beeswax and peanut oil, a new preparation which is fluid at room temperature: Absorption and therapeutic use. J. Lab. & Clin. Med. 32:34 (Jan.) 1947.

12. Dowling, H. F., and Hirsh, H. L., The use of penicillinase in cultures of body fluids obtained from patients under treatment with penicillin. Am. J. Med. Sci. 210:756 (Dec.) 1945.

13. Masse, M., and Battistini, G., Anticomplementary action and inhibition of bactericidal power of blood by sodium polyanethosulfonate used in hemoculture. Zentralbe. F. Bakt. (Abt. I) 131:241, 1941.

14. Bajocchi, P., Contributo allo studio delle batteremia chirurgiche con emoculture comparate: Batteremie pre e post-operatorie negli interventi asettici. Gior. di batteriol. e immunol. 21:63, 1938.

15. Von Haebler, T., and Miles, A. A., The action of sodium polyanetholesulphonate (Liquoid) on blood cultures. J. Path. & Bact. 46:245 (Mar.) 1938.

16. Hoare, E. D., The suitability of Liquoid for use in blood culture media with particular reference to anaerobic streptococci. J. Path. & Bact. 48:573 (May) 1939.

Table • Number of patients with bacteremia following dental extraction*

Organisms	Immediately after extraction		10 minutes after extraction		30 minutes after extraction		Total number of cultures†		Total number of patients	
	Control group	Penicillin treated group	Control group	Penicillin treated group	Control group	Penicillin treated group	Control group	Penicillin treated group	Control group	Penicillin treated group
	*	*	*	*	*	*	* ‡	* ‡	*	*
	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %
All organisms	22 34	13 20	14 22	10 15	8 12	7 11	44 100	30 100	30 46	24 37
Alpha and gamma streptococci	19 29	8 12	7 11	3 5	2 3	0 0	28 64	11 37	22 34	10 15
Other organisms§	6 9	6 9	9 14	8 13	6 9	7 11	21 36	21 63	9 14	16 25

*Some patients had more than one organism in the culture at the same time.
†Positive at all three periods for different organisms.
‡Of total number of positive cultures.
§Staphylococcus albus and aureus, Diphtheroids, Neisseriae.

to the growth of anaerobic streptococci. The flasks were inspected daily and subcultures on blood agar plates were made as soon as growth appeared, or routinely after seven days if no growth was apparent.

RESULTS

A total of 65 patients received penicillin while 65 patients served as controls. The two groups were similar with respect to age, sex and racial distribution, as well as to oral hygiene and type of surgery performed. An average of 2.4 teeth (range 1 to 11) were extracted from patients in the control group; the average in the treated patients was 3.1 teeth (range 1 to 14). The details of the bacteriologic findings have been reported elsewhere.[17]

The incidence of bacteremia in both groups, found in both aerobic and anaerobic cultures, is shown in the Table. Immediately after extraction 22 patients (34 per cent) in the control group had bacteremia as against 13 (20 per cent) in the penicillin treated group. Ten minutes after extraction bacteremia was noted in 14 patients (22 per cent) in the control group as compared with 10 patients (15 per cent) in the penicillin treated group, and at 30 minutes the figures were 8 (12 per cent) for the patients in the control group against 7 (11 per cent) for the penicillin treated group. A total of 30 control patients (46 per cent) against 24 penicillin treated patients (37 per cent) developed bacteremia following dental extraction at one or more of the times tested. Six patients in the control and 2 in the penicillin treated group had persistent bacteremia at more than one interval.

Since the alpha and gamma streptococci are more significant in the pathogenesis of endocarditis, evaluation of the results on this basis becomes necessary before definite conclusions can be reached. It can be seen that penicillin was instrumental in decreasing the incidence of bacteremia due to the streptococci but not

17. Hirsh, H. L.; Vivino, J. J.; Merril, A., and Dowling, H. F., The effect of prophylactically administered penicillin on the incidence of bacteremia following extraction of teeth: Results in patients with healed rheumatic and bacterial endocarditis. Arch. Int. Med. 81:868 (June) 1948.

that due to the other organisms. The difference in incidence of bacteremia in the control group, 34 per cent, as compared with the penicillin treated group, 15 per cent, is statistically significant. This is also true for the period immediately following extraction, when 19 (29 per cent) of the control patients and 8 (12 per cent) of the penicillin treated patients had a streptococcal bacteremia. The differences for the other two periods approach statistical significance.

In addition to decreasing the incidence of bacteremia, penicillin appears to decrease the persistence of bacteremia. Only 2 patients in the treated group had bacteremia at more than one interval, whereas 6 patients in the control group had positive blood cultures at more than one period tested.

In order to evaluate more completely the effect of the penicillin, the sensitivities of the isolated organism were determined and compared with the blood concentration of penicillin at that time. It was found that in the case of the alpha and gamma streptococci the concentration of penicillin in the blood was always greater than in the *in vitro* sensitivity. Among the other organisms about one-half were sensitive to less and the rest were resistant to more than the penicillin concentration present in the blood at the time.

A review of these data indicates no correlation between the incidence of bacteremia and age, sex, race or condition of the mouth of the patient. There was a definite correlation, however, between the incidence of bacteremia and the severity of the surgery. In patients with type 1 extractions no positive cultures were found in either group. When type 2 and 3 extractions were necessary, 31 per cent of the patients receiving penicillin had bacteremia, while in the control group the incidence was 36 per cent and 50 per cent for each type, respectively. In the penicillin treated group requiring type 4 surgery no positive cultures were found, whereas in the control group the incidence of bacteremia was 40 per cent.

During the course of our investigation 7 patients with rheumatic or healed bacterial endocarditis, who required dental extractions, were also studied. Extractions were performed on eleven occasions and all the patients were given penicillin. On four occasions the dose was 25,000 units of crystalline penicillin one hour before extraction and every three hours thereafter for seven additional doses. For the remaining seven series of extractions, the patients received 600,000 units of penicillin in oil and wax (2 cc.) three to four hours before extraction. On four occasions bacteremia was observed immediately after extraction. From three of the positive cultures, strains of alpha streptococci were isolated and from the fourth a strain of *Staphylococcus albus*. All the patients made an uneventful recovery and have remained well during the period of observation for periods extending from 6 to 24 months. The strain of *S. albus* and one of the strains of streptococci were found to be sensitive to less penicillin than was assayed in the blood, while the other two strains of streptococci were resistant to the penicillin concentrations present in the blood at that time.

DISCUSSION

From an evaluation of these results it is possible to determine some of the precautions to be taken prior to dental extraction if one of the causes of bacterial endocarditis is to be eliminated or minimized. The use of the sulfonamides as a prophylactic measure in controlling bacteremia following the extraction of teeth has proved inadequate. Although some reports[18, 19, 20] have indicated that the

18. Pressman, R. S., and Bender, I. B., Effect of sulfonamide compounds on transient bacteremia following extraction of teeth. I. Sulfanilamide. Arch. Int. Med. 74:346 (Nov.) 1944.

19. Bender, I. B., and Pressman, R. S., Factors in dental bacteremia. J.A.D.A. 32:836 (July) 1945.

sulfonamides were effective, it is difficult to evaluate these reports since para-aminobenzoic acid was not added to the culture media and controlled series were not included. It has been demonstrated that even small amounts of sulfonamides present in body fluids may inhibit the growth of bacteria in culture media unless para-aminobenzoic acid is added to ineffectuate the sulfonamides.[21]

Glaser and his associates[22] have presented results with penicillin which were similar to ours. They found that 60 per cent of the patients in the control group had bacteremia due to alpha streptococci, while only 40 per cent of the penicillin treated group developed postoperative bacteremia due to alpha and gamma streptococci. They therefore recommend high doses of penicillin for at least 24 hours before extraction, and for two or three days thereafter.

On the basis of the work published by Glaser and associates[22] and the results of the above study, an attempt has been made to determine an optimal dose and time of administration in order to diminish more effectively the incidence of bacteremia following the extraction of teeth. It appears essential that sufficient penicillin be used to insure a high concentration in the blood and tissues of the mouth for at least 24 hours before extraction. Furthermore, there should be a peak concentration in the blood during and immediately after the extraction and adequate blood concentrations should be maintained for at least 24 hours after extraction. Others[23, 24] believe penicillin should be given for two days before and two days after extraction. The simplest and most practical means of obtaining these conditions appears to be the administration of a procaine penicillin preparation in doses of 300,000 units per day.

Patients with a known history of heart disease and those in whom the diagnosis is made immediately prior to extraction are best managed cooperatively by dentist and physician. It is the obligation of the dentist and physician to determine who should receive such prophylactic care before dental extraction. All patients should be questioned for previous history of rheumatic fever, chorea, joint pains, growing pains, unexplained periods of fever, frequent sore throats, scarlet fever, or any manifestation of the rheumatic diathesis. If there is a definite history of rheumatic fever, or even a suggestive one the patient should be advised of the necessity of medical examination before undertaking dental surgery. Patients with a history of cardiac difficulties such as dyspnea, cyanosis, edema of the extremities or clubbing of the fingers, should be similarly managed.

SUMMARY AND CONCLUSION

1. A group of 130 patients requiring dental extraction were divided into two groups. One group received 600,000 units of penicillin in wax and oil three to four hours before extraction, the other served as a control. Teeth were extracted and blood cultures were obtained immediately, 10 minutes and 30 minutes after extraction, incubated aerobically and anaerobically and then studied for the presence of bacteria.

2. In the control group, 46 per cent of the patients developed bacteremia. In 34 per cent the organism identified was an alpha or gamma streptococcus. Six patients had positive cultures for the same organism at more than one of the periods studied. In the penicillin treated group, 37 per cent had bacteremia. Alpha or

20. Northrop, P. M., and Crowley, M. C. Further studies on the effect of the prophylactic use of sulfathiazole and sulfamerazine on bacteremia following extraction of teeth. J. Oral Surg. 2:134 (April) 1944.

21. Woods, D. D., The relation of para-aminobenzoic acid to the mechanism of the action of sulfanilamide. Brit. J. Exper. Path. 21:74 (April) 1940.

22. Glaser, R. J.; Dankner, A.; Mathis, S. B., and Harford, C. B., Effect of penicillin on the transient bacteremia following dental extraction. (Abst.) Am. J. Med. 3:115 (Aug.) 1947.

23. McDermott, W., Personal communication.

24. Romansky, M. J., Personal communication.

gamma streptococci were isolated from the blood of 15 per cent of the patients. Two patients had bacteremia at more than one period.

3. Since bacterial endocarditis is such a serious infection it behooves the dentist to attempt to prevent the bacteremia which follows dental extraction.

4. A tentative plan of penicillin prophylaxis has been evolved from available studies and consists of daily injections of 300,000 units of procaine penicillin G preparation two days before and two days after extraction.[25] As an additional precaution, the extractions should be performed under local anesthesia incorporating epinephrine. Manipulation procedures should be kept to an absolute minimum. It would appear that there are no precautions necessary regarding the number of teeth that may be extracted at one time.

25. Since this work was completed a new preparation of penicillin, procaine penicillin G, has supplanted penicillin in oil and beeswax because of its superior pharmacological properties. For that reason this preparation is recommended in place of penicillin in oil and beeswax, the preparation employed in this study. Despite the favorable effects of a prophylactically administered single 600,000 unit dose of a repository type of penicillin preparation on the incidence of bacteremia following dental extraction, additional data indicate that a more reliable plan of prophylaxis includes daily injections of 300,000 units of procaine penicillin for two days before and two days after extraction, whenever possible.

Laboratory methods in the clinical evaluation of caries activity

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The purpose of this report is to review the present status of laboratory tests as useful tools in the clinical evaluation of caries activity with special reference to the adaptation of any one to office practice. This might not be such a difficult subject if there were agreement about a specific etiology of dental caries, but such an etiology, acceptable under the postulates of Koch, is still lacking. Therefore, any or all tests so far described, since the first was introduced in 1931, come under the heading of "nonspecific" and are subject to the bias, whether right or wrong, of the authors of the respective procedures.

They are based upon assumptions ranging from the presence or absence of certain bacteria, such as the lactobacillus, to special chemical or biologic properties of the saliva. The results obtained have been correlated statistically with observed clinical change. Fortunately, some of these tests have been found to be very accurate for the estimation of caries activity and measuring the effectiveness of therapy. It should in all fairness be stated that the nonspecificity of a test does not necessarily eliminate it from consideration. There are too many well-known examples; for instance, any of the standard serological tests for syphilis where the antigen is normal tissue extract, or the

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use of Proteus OX strains in the detection of rickettsial antibodies. The important thing is that the results of a test and their interpretation shall be acceptable to the profession. This seems to be the case for one laboratory test, the lactobacillus count, but it is too complicated for the office. Of the others only one or two are sufficiently simple to be used in the dental office.

It is proposed, therefore, to list the features of an ideal laboratory test for office use, to compare each laboratory method in respect to the requirements of this ideal, to discuss the basis of the respective test, to comment on its status and usefulness to the clinician and to furnish a more complete description of one, the Snyder test, concerning its applicability for office practice.

THE IDEAL OFFICE LAROATORY TEST

It should be emphasized that "ideal" is employed here to describe a test which will give as much basic or qualitative information as quickly as possible. This test could not be otherwise if the average dentist wished to incorporate it as a routine office procedure. The requirements of a laboratory test designed to meet office needs as an aid in the evaluation of caries activity and effectiveness of therapy are:

1. Should have maximal correlation with clinical status.
2. Should be accurate in respect to duplication of results.
3. Should be rapid in performance.
4. Should be simple.
5. Should require minimum equipment.
6. Should require minimum skill.
7. Should have low cost per test.

These criteria are the same for any good laboratory test, but the necessity of employing precision equipment for quantitative data frequently removes a test from the hands of the practitioner and places it in the hands of the specialist.

THE LACTOBACILLUS COUNT

Although Rodriguez,[1] Bunting and associates[2-5] and Enright, Friesell and Trescher[6] demonstrated a clearcut relation between the presence or absence of lactobacilli and caries, it remained for Rodriguez[7] in 1931 to describe a quantitative method for the estimation of numbers of lactobacilli in the saliva. Because of the inherent difficulties of preparing serum-glucose agar, Hadley[8] (1933) adapted Kulp's tomato-peptone agar to meet this problem. Stated briefly, in this method a count of the characteristic colonies on the surface of this medium provides an estimate of the number of lactobacili per milliliter in the specimen of saliva. Using this method, the Michigan group confirmed their previous qualitative findings, and noted that in general the degree of caries activity was directly proportional to the number of lactobacilli in the saliva. There were cases, however, without clinical change but showing consistently positive lactobacillus counts, which Jay[9] has explained on a "healthy carrier" basis. The conclusions of the Michigan group have been widely accepted in the dental profession and have been applied on a large scale both for clinical diagnosis of caries activity and

1. Rodriguez, F. E. Studies in the specific bacteriology of dental caries. Military D. Jnl. 5:199, 1922.
2. Bunting, R. W., and Palmerlee, F. The role of Bacillus acidophilus in dental caries. J.A.D.A. 12:381 (April) 1925.
3. Bunting, R. W.; Nickerson, G., and Hard, D. G. Further studies of the relation of Bacillus acidophilus to dental caries. D. Cosmos 68:931 (Oct.) 1926.
4. Hadley, F. P.; Bunting, R. W., and Delves, E. Recognition of Bacillus acidophilus associated with dental caries. J.A.D.A. 17:2041 (Nov.) 1930.
5. Hadley, F. P., and Bunting, R. W. Further studies on recognition of Bacillus acidophilus. J.A.D.A. 19:28 (Jan.) 1932.
6. Enright, J. J.; Friesell, H. E., and Trescher, M. O. Studies of the cause and nature of dental caries. J. D. Res. 12:759 (Oct.) 1932.
7. Rodriguez, F. E. A method of determining quantitatively the incidence of Lactobacillus acidophilus odontolyticus in oral cavity. J.A.D.A. 17:1711 (Sept.) 1930.
8. Hadley, F. P. A quantitative method for estimating Bacillus acidophilus in saliva. J. D. Res. 13:415 (Oct.) 1933.
9. Jay, P. Personal communication.

evaluation of diet therapy. However, despite all the work which went into the investigation to reach their conclusions, the actual number of cases listed by the Michigan group in their publications with supportive laboratory data were dangerously few. A review of the literature confirmed the fact that while few studies[10, 11, 12] have been reported which tested this thesis by means of periodic sampling, the number of subjects was reasonably adequate, ranging from 34 in one series studied by Snyder[10] to 810 in another by Blayney and his associates.[12] In these reports the positive correlation between caries activity and the presence of lactobacilli varied from 67 to 90 per cent with the majority above 80 per cent. Thus, it would outwardly appear that the lactobacillus count is not too good; possibly it should not have been so readily accepted as a a standard. However, it is extremely difficult to reduce periodic quantitative data to qualitative figures and still show the fluctuations which occur, since the latter are important in the problem of interpretation. This is especially true with the sporadic occurrence of lactobacilli where the frequency and numbers found may, and do, profoundly influence the opinion of both laboratory worker and clinician. Taking all this together with the knowledge of the difficulties associated with adequate sampling, it seems remarkable that there is a consistent 80 to 85 per cent correlation with the results of this biological test. No other laboratory method has yielded significantly better correlative data. This statement should not be construed as a brief for the lactobacillus count but should urge a search for one that can be shown to be either more accurate or more specific in its results. Until that time, however, it should be accepted as it now stands.

The value of this test may be appraised by characterizing it according to the categories used to define the ideal test, as follows:

1. Clinical correlation: excellent (80-90 per cent).
2. Accuracy: roughly quantitative numbers of lactobacilli per milliliter saliva.
3. Time: four days.
4. Simple: no.
5. Equipment: complex.
6. Personnel: bacteriological training required.
7. Cost: high.

Anyone familiar with the lactobacillus count knows that for all practical purposes it is strictly a laboratory procedure and few dental offices have space, equipment or personnel to conduct it. As a result, it has become the function of the dental division of many state departments of health to have these tests performed in their laboratories as a service to the dental profession. Despite the technical objections that can be raised about this method, it has remained the standard for the field, and in all serious studies since its introduction it has been used as a yardstick against which laboratory data obtained with new methods are usually compared.

The interpretation of these data warrants some comment. It should be clearly understood that any laboratory test yields figures valid only for the method and specimen analyzed, and subject to all the factors influencing these results; that is, the test will indicate present status only. Since dental caries is a progressive disease with wide variations in severity over long periods of time, it can be represented graphically if a number of comparable periodic examinations are made. Similarly, a correlative graph can be con-

10. Snyder, M. L. The occurrence of lactobacilli and other acidogenic organisms in the salivas of selected caries-free children. J. D. Res. 18:497 (Dec.) 1939.

11. Arnold, F. A., Jr., and McClure, F. J. A study of the relationship of oral Lactobacillus acidophilus and saliva chemistry to dental caries. Pub. Health Rep. 56:1495 (July 25) 1941.

12. Blayney, J. R., and Bradel, S. Clinical and bacteriologic studies on dental caries. J.A.D.A. 27:1601 (Oct.) 1940.

structed from laboratory data, but only if adequate sampling establishes the initial level and those changes occurring in time. When conditions are met, the lactobacillus count provides a reliable index of present caries activity and is reasonably prognostic. It is astonishing, therefore, to find several recent studies[13, 14] comparing activity of saliva with the DMF figure, which represents the accumulation of past caries experience. The statistical analysis of their results usually shows correlation coefficients of significance between the lactobacillus count and DMF, but it is not high enough to permit predictability; therefore, the lactobacillus count is of no value. They fail to understand that the DMF figure, which may include clinical change of many years' standing, is by no means a reliable index of present or concurrent caries activity. This status can only be determined by laboratory methods and is reflected in the future by clinical change.

THE CALCIUM DISSOLUTION TEST

This test was introduced by Fosdick, Hansen and Epple[15] in 1937. The results are expressed quantitatively in terms of milligrams of powdered enamel dissolved in four hours by the acid formed in saliva-glucose mixtures. Data from this test show that the rate of dissolution of enamel is significantly increased with specimens of saliva from persons with caries over those persons without caries.

The calcium dissolution test may be appraised as follows:

1. Clinical correlation: good.
2. Accuracy: excellent. Milligrams of powdered enamel dissolved in saliva-glucose mixtures.
3. Time: four hours.
4. Simple: no.
5. Equipment: complex.
6. Personnel: chemical training desirable.
7. Cost: high.

Although it has been demonstrated by the authors that the results of this test are closely correlated with clinical results, the tabulation indicates the shortcomings in the requirements of complex equipment and technical skill. In a recent personal communication, Dr. Fosdick states this test is a research tool and not a clinical laboratory procedure. By Dr. Fosdick's recommendations, it would appear that the calcium dissolution test is not for office practice.

THE WACH TEST

This test was described by Wach, Kesel, Hine and O'Donnell[16] in 1943. It is based on the rapid production of acid in saliva-glucose mixtures. The amount of acid formed in four hours as determined by titration with standard alkali, is greater if the person has caries. In a carefully conducted clinical study of 50 young adults covering a period of two years and over 2,000 specimens of saliva, Wach and associates reported an 86 per cent correlation between acid production and presence or absence of caries activity. The amount of the acid formed was not indicative of the extent of the carious process. This was especially true for a small number of specimens, 1 per cent, where there was rapid acid formation but no caries activity; these exceptions were caused by acidogenic streptococci. Similarly, the amount of acid produced was not closely correlated with numbers of lactobacilli. Wach felt that the test could readily be adapted to office practice.

13. Boyd, J. D.; Cheyne, V. D., and Wessels, K. E. Correlation of lactobacillus counts with caries extent in an institutional population. J. D. Res. 27:736 (Dec.) 1948.

14. Marshall-Day, C. D., and others. Oral bacteriological studies in Puerto Rican children. J. D. Res. 28:648 (Dec.) 1949.

15. Fosdick, L. S.; Hansen, H. L., and Epple, C. Enamel decalcification by mouth organisms and dental caries. A suggested test for caries activity. J.A.D.A. & D. Cosmos 24:1275 (Aug.) 1937.

16. Wach, E. C., and others. Testing caries activity by acid production in saliva. J. D. Res. 22:415 (Oct.) 1943.

The Wach test may be appraised as follows:

1. Clinical correlation: excellent. (?)
2. Accuracy: excellent. Measurement of pH change or titratable acid in saliva-glucose broth cultures.
3. Time: four hours.
4. Simple: yes.
5. Equipment: simple.
6. Personnel: no special skill required.
7. Cost: low.

It can readily be seen that the Wach test begins to approach the ideal in many respects. The time required is only four hours; the equipment is simple (burette, a few beakers, 1 per cent glucose, standard alkali and an indicator). The major difficulty in office practice would be the necessity of running a four hour test when an appointment is in the late afternoon. The only criticism of the Wach test is that so little is known about it. Nathan[17] reported a limited study in which he compared the accuracy of the Snyder and Wach tests with lactobacillus counts. He found the Snyder test did but the Wach test did not correlate with the number of lactobacilli. Additional work should be done with the Wach test which has definite possibilities for office adaptation.

THE AMYLASE TEST

This test was advocated by Florestano, Faber and James[18] in 1941 and Turner and Crane[19] in 1944 as an index of caries activity. The test depends upon the rate of disappearance of the iodine reaction (blue color) in starch solutions by the action of the salivary enzyme, amylase. Although in the respective studies reported there was a significant shortening of the time of hydrolysis with an increase in the number of visible lesions, the figures submitted were for the most part limited to single specimens of saliva compared with a carious index. On the other hand, Bergeim and Barnfield[20] and Hess and Smith[21] could find no relation, by standardized technics, between the amylase content of salivas from individuals with caries and those without. The test may be appraised as follows:

1. Clinical correlation: variable with study reported.
2. Accuracy: good. Disappearance of starch-iodine reaction.
3. Time: 10 minutes.
4. Simple:
5. Equipment: simple.
6. Personnel: no special skill required.
7. Cost: low.

Except for the fact that there is no agreement among investigators concerning the reliability of this test as an index of caries activity, this procedure closely approaches the ideal. It seems unfortunate that none of these workers carried out a careful periodic study for comparative purposes. This test cannot, therefore, be recommended until further data based on clinical study are available to provide a specific answer.

THE COLORIMETRIC OR SNYDER TEST

This test, described by Snyder[22] in 1940, depends on the rate of color change resulting from acid production by oral bacteria in a selective culture medium (pH 5.0) containing bromcresol green as the

17. Nathan, J. R. An experimental study of various caries susceptibility tests. Tufts D. Outlook 19:4 (Oct.) 1945.

18. Florestano, H. J.; Faber, J. E., and James, L. H. Studies on the relation between the diastatic activity of saliva and incidence of dental caries. J.A.D.A. 28:1799 (Nov.) 1941.

19. Crane, E. M., and Turner, N. C. Relationship between dental caries and saliva. J. D. Res. 23:413 (Dec.) 1944.

20. Bergeim, O., and Barnfield, W. F. Lack of correlation between dental caries and salivary amylase. J. D. Res. 24:141 (June-Aug.) 1945.

21. Hess, W. C., and Smith, B. T. The salivary amylase activity of carious and noncarious individuals. J. D. Res. 27:593 (Oct.) 1948.

22. Snyder, M. L. A simple colorimetric method for the estimation of relative number of lactobacilli in the saliva. J. D. Res. 19:349 (Aug.) 1940.

indicator. This test has been shown[23] to be equal to the lactobacillus count, if not superior, for the estimation of caries activity. Informal reports from clinicians have also supported these findings. The Snyder test may be appraised as follows:

1. Clinical correlation: excellent.
2. Accuracy: good. Change in color of indicator, bromcresol green, induced by bacteria of saliva inoculated into medium (pH 5.0).
3. Time: 24-48 hours.
4. Simple: yes.
5. Equipment: simple.
6. Personnel: no special skill required.
7. Cost: low.

The tabulation shows that the Snyder test has most of the requirements needed for the ideal test except for the matter of time which covers 48 hours. The latter feature has some advantage in that the test requires a daily observation in place of fixed time study. It is simple to do since it needs only a few pipettes, tubes of culture media and a small incubator. Hence, it can be adapted to office practice.

There are one or two other laboratory tests, such as the buffering capacity of the saliva, but inadequate clinical data prevent inclusion in this paper. A recapitulation of the salient features of the laboratory tests described merely confirms the fact that the ideal laboratory test is not yet available. This leaves only the matter of pointing out which most closely approaches the ideal described. For office practice, the lactobacillus count and calcium dissolution test are too complex and costly. Of the three simple tests, the Snyder, Wach and amylase, only the Snyder test has received sufficiently favorable clinical comment to warrant a detailed review of its background, procedure, interpretation and application as a routine office procedure.

The colorimetric, or Snyder test, is a partial answer to a standing request by R. W. Bunting for a simple laboratory test for office use. Although the lactobacillus count was developed in his laboratory, he knew the requirements made it too complex for the purpose desired. The colorimetric test is based on two facts: a pH less than 5.0 is required to accelerate enamel decalcification; a characteristic of the genus *Lactobacillus* is for its members not only to provide this acidity but also to live and multiply in such an environment. It seemed logical, therefore, to use a medium adjusted to pH 5.0 and to measure additional acid production with an appropriate indicator. The problem was simplified by the limited choice of indicators and that ordinary culture media could be used. Since it was known that acid production in glucose broth was not to be correlated with lactobacillus counts,[9] there remained only the matter of testing the effect of dispersion of the inoculum. This was done by adding agar to a broth medium to give the following formula:

Infusion broth	1,000 ml.
Glucose	20 Gm.
Bromcresol green (0.04% aq.)	50 ml.
Adjust to pH 5.0 with lactic acid	
Agar	20 Gm.

The final product was a bluish green medium which could be autoclaved and kept indefinitely in screw-capped tubes. When a tube was inoculated with saliva after preliminary boiling and cooling to 50° C., the result was a "shake" tube culture which has long been known to bacteriologists.

It soon became apparent, with a medical class furnishing the specimens, that a direct relation between color change and lactobacillus count was present; that is, the higher the count, the more rapid and

23. Snyder, M. L. Correlation and comparison of laboratory findings with clinical evidence of caries in a group of sixty-six children. J.A.D.A. 29:2001 (Nov.) 1942.

Table 1 • Grouping of children in respect to caries activity by clinical and laboratory diagnoses

Caries activity	Laboratory estimates	
	Lactobacillus count	Colorimetric test
Negative No clinical lesions over 2 year period	Loctobacilli absent in saliva or only present sporadically	Negative color change in 72 hours or occasionally positive
Questionable Previous DMF but clinical change doubtful	Lactobacilli frequently present but absent many times	Frequent positive tests in 48 hours
Positive Measurable change	Lactobacilli present consistently or in several successive specimens	Positive color change in 24 to 48 hours consistently or in consecutive specimens

greater the color change. The color changes were not, nor have they ever been, as sharp as desirable, but no other indicator, or combination of indicators, has as yet been found which gives better differentiation. The indicator, bromcresol green, has a useful range of blue at pH 5.4 to yellow at pH 3.8. At the halfway point, pH 4.6 a pure green is the color; this is lost as yellow becomes dominant at approximately pH 4.2. These changes were graded in the following manner:

Negative
- 0 or no change
- + slight change in green color (pH 5.0–4.4)

Positive
- ++ green no longer dominant color
- +++ nearly complete change
- ++++ complete change to yellow (pH 4.2–3.8)

These changes are not particularly sharp. For maximal results, the tubes should be held against a white background and examined with reflected light. Under these conditions few people have difficulty in determining the extremes. It is the decision where green is no longer the dominant color, or a two plus reading, where the individual variation in color differentiation will be the greatest. For all practical purposes it seems best to record as positive any or all changes which differ significantly from the uninoculated controls.

The first attempt to evaluate this test was in Philip Jay's laboratory where several hundred tests were run in conjunction with lactobacillus counts. An inoculum of 0.2 ml. of saliva seemed to give the best results, which clearly showed a definite relation between rate of color change and numbers of lactobacilli in respective specimens of saliva. Although this correlation was of great interest and supported the original hypothesis, it also was recognized that the test reflected acid production by all the bacteria in the inoculum of saliva under conditions of growth considerably different from the usual aerobic plate count. It seemed possible, therefore, that this measurement might avoid many of the objections to the lactobacillus count and actually be a more accurate index of caries activity than the former method. The only answer could be provided by a trial study, which was conducted over an 18 month period at the University of Michigan Elementary School.

This school was selected because the children usually stay over the entire six

year elementary period and are examined periodically by clinical and roentgenologic means in respect to the anthropologic development of head and dentition. The dental examiners were graduate students in orthodontics. The subjects were children in the first, second and third grades (6 to 9 years of age). This included a reasonable number of children who were free from caries, but who would normally be subject to caries. The specimens of saliva were collected at approximately monthly intervals during the school year and cultured in the medium described. Lactobacillus counts were made of the respective specimens. Only one major change was made in the culture medium and that was the introduction of a standardized, dehydrated culture medium.[24] The laboratory results were tabulated and

24. Supplied by the Difco Laboratories.

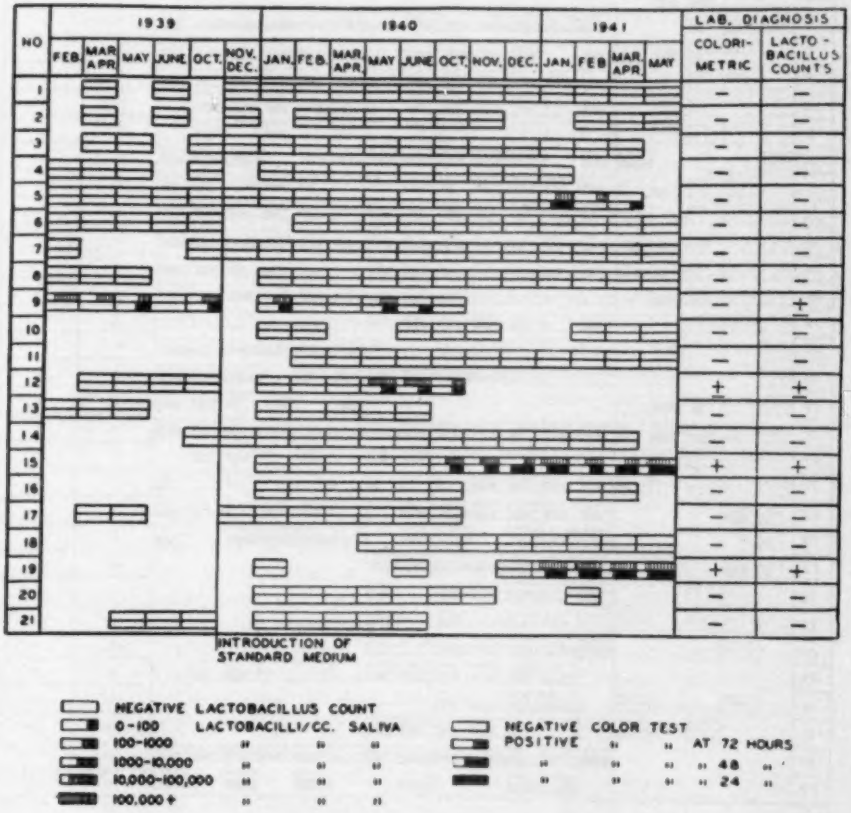

Fig. 1 • Comparison of laboratory with clinical diagnosis of caries activity in a group recorded as caries negative

an estimate of caries activity was made for each child. These estimates were then compared with the clinical examinations, covering six months before and after laboratory studies (Table 1).

The estimate of caries activity for each child by two laboratory methods, lactobacillus count and colorimetric test, compared with the independent clinical diagnosis for the respective child is presented

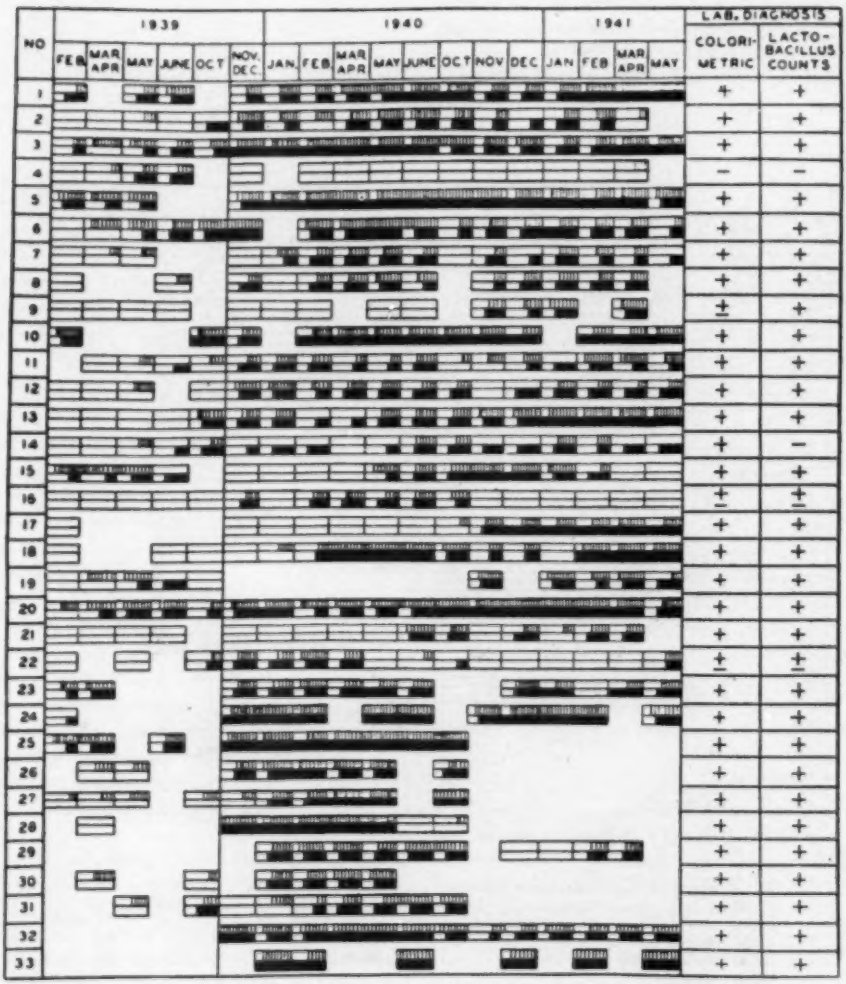

Fig. 2 • Comparison of laboratory with clinical diagnosis of caries activity in a group recorded as caries active

Table 2 • Correlation between clinical and laboratory diagnosis of caries activity

Summation of clinical activity	Number of children	Laboratory diagnosis					
		Negative		Questionable		Active	
		Color	Lactobacillus	Color	Lactobacillus	Color	Lactobacillus
Negative	21	18	17	1	2	2	2
Questionable	12	7	7	1	2	4	3
Active	33	1	2	3	2	29	29

for the caries active and inactive groups in Figures 1 and 2.

These figures show better than any other way the value of periodic data for the estimation of caries activity. They also illustrate the problem of sampling at any one time, the matter of sporadic occurrence of lactobacilli, the necessity for long term study and the difficulty of changing these data into qualitative estimates. It is no wonder that workers studying smaller groups over limited time intervals, or single specimens from large numbers, arrive at varying answers. It is obvious in this study that there were some exceptions to the laboratory diagnosis. Jay explains the cases with lactobacilli and no clinical change on the "carrier" basis such as the healthy carrier of diphtheria bacilli. Despite the variations in number and occurrence of lactobacilli, there was not a single case recorded as clinically active in which lactobacilli were not found at some time. Case 4 in Figure 2 illustrates the point of so few organisms being present that the laboratory estimate was of caries inactivity. Several explanations can be offered: the sampling was inadequate; visible change occurred after the individual had become bacteriologically negative, and thereby was recorded as clinically active; the examiners included lesions not present. Some investigators might hold that this single case is enough to invalidate the whole lactobacillus work and reduce to absurdity laboratory methods based on this concept. Nevertheless, the over-all correlation of laboratory diagnosis made independently of clinical measurement of caries activity is remarkably consistent and difficult to negate. The results of the entire study are summarized in Table 2.

These results confirm the excellent correlation between laboratory and clinical data. They also show the colorimetric test to be equal, if not slightly superior, to the lactobacillus count in making qualitative laboratory diagnoses of caries activity.

During this period, some effort[25] was made to determine the influence of various oral bacteria upon the production of acid in this medium. Thirty strains each of oral lactobacilli, staphylococci, yeastlike organisms (*Candida*) and streptococci were isolated and subcultured in glucose broth prior to inoculation into Snyder test agar. These organisms were tried in pure culture and mixed in various combinations to simulate the conditions in the oral cavity. Some answer was sought to the claim of Fosdick, Hansen and Epple[26] that when yeastlike organisms were grown with lactobacilli there

25. Snyder, M. L., and Teachout, J. Acid production of oral bacteria associated with dental caries. J. D. Res. 21:461 (Oct.) 1942.

26. Hansen, H. L.; Fosdick, L. S., and Epple, C. F. The action of mouth organisms on certain carbohydrates. J.A.D.A. & D. Cosmos 24:1611 (Oct.) 1937.

Table 3 • Production of acid in Snyder test agar by pure cultures of oral lactobacilli, streptococci, staphylococci, yeastlike organisms and in various combinations

Types	Am't. Inoc. cc.	Positive color changes in hours			
		24	48	72	96
Streptococci	0.2	0	0	0	0
Streptococci Staphylococci	0.1 0.1	0	0	3	5
Staphylococci	0.2	0	3	5	6
Streptococci Yeasts	0.1 0.1	0	0	0	0
Staphylococci Yeasts	0.1 0.1	0	0	2	3
Yeasts	0.2	0	0	0	1
Lactobacilli Yeasts	0.1 0.1	28	29	29	29
Staphylococci Lactobacilli	0.1 0.1	28	29	29	29
Streptococci Lactobacilli	0.1 0.1	28	29	29	29
Lactobacilli	0.2	29	29	29	30

was a greater amount of acid formed than when either was cultured alone. This phenomenon is known as synergism and must certainly occur in the natural process (Table 3).

Table 3 clearly shows that the only organisms producing positive color reactions in 24 hours were the lactobacilli. In 48 hours a few strains of staphylococci induced positive color change. Any combination without lactobacilli failed to produce a positive reaction in 24 hours. It was not possible to ascertain if a synergistic action of the yeastlike forms and lactobacilli occurred since the limit of the indicator was reached in the same time whether or not the yeastlike organisms were present. These data made it apparent, for the most part, that positive color reactions in 24 to 48 hours are essentially dependent upon the presence of lactobacilli in the saliva.

The comparison of incidence and rate of color change with numbers of lactobacilli in specimens of saliva are shown in Table 4.

From Table 4 it can be seen that the percentage of positive color tests becomes not only greater with increasing numbers of lactobacilli but occurs more rapidly. This is especially true with the clinically active group where 87 per cent of the specimens containing more than 100,000 lactobacilli per milliliter of saliva produced a positive change in 24 hours. Conversely, no specimen of saliva containing less than 1,000 lactobacilli per milliliter of saliva caused a positive test in 24 hours, and only 12 per cent of the group did so in 48 hours, irrespective of clinical status. These results indicated that the colorimetric test could be used to select individuals in respect to caries activity in the following way: a positive test in 24 hours indicated greater caries activity than one in 48 hours; a negative test in 48 hours indicated negative or slight caries activity.

In 1947, in cooperation with the Oregon State Department of Health and the Children's Bureau, a laboratory service to perform lactobacillus counts for the dental profession of the state was established at the University of Oregon Dental School. This laboratory division furnished an additional opportunity to test the colorimetric method in respect to lactobacillus counts of specimens of saliva routinely submitted for culture. However, in contrast with the first study, knowledge of the clinical status of the individual was not readily available and the specimens of saliva were subject to all the delays of home collection and mailing. The analysis of a year's work showing the comparison of the reactions of the Snyder test with numbers of lactobacilli in respective specimens of saliva is shown in Table 5.

The table shows that results collected by this type of study are in essential agreement with those recorded previously and, considering the general accuracy of biological tests, have few exceptions at the extremes. The figure of 46.6 per cent for positive tests in 24 hours with specimens containing more than 100,000 lactobacilli per milliliter of saliva is in contrast to the 86 per cent recorded in the first investigation. However, the two groups were not strictly comparable.

These figures may be interesting to the research worker but not to the practicing dentist who has to tie his results to something of meaning to himself and the patient. If the arbitrary figure of 10,000 lactobacilli per milliliter of saliva, given by Jay for that limit above which dietary therapy should be instituted, is acceptable to the profession, regrouping of all the data in respect to that figure gives the results shown in Table 6.

It is readily discernible from Table 6 that the results of the two studies are not too far apart considering that one study was reasonably controlled and that the other was not. The interesting features are the identical values of 2.4 per cent for the production of positive color changes in 24 hours with specimens containing less than 10,000 lactobacilli per milliliter of saliva and essentially the same results of 92 and 99 per cent in 48 and 72 hours, respectively, with specimens containing greater than 10,000 lactobacilli saliva. These data furnish the key to the usefulness of the Snyder test in clini-

Table 4 • Comparison of incidence and rate of color change in Snyder test agar with numbers of lactobacilli in respective specimens of saliva

Summation clinical activity	Number subjects	Lactobacillus counts	Number specimens	Positive color reactions					
				24 hours		48 hours		72 hours	
				No.	Per cent	No.	Per cent	No.	Per cent
Negative	21	0	180	0	0	0	0	2	1
		0-100	1	0	0	1		1	
		100-1,000	3	0	0	2	67	3	100
		1,000-10,000	6	0	0	1	16	6	100
		10,000-100,000	8	0	0	6	75	8	100
			198						
Questionable	12	0	72	0	0	2	3	4	6
		0-100	9	0	0	1	11	7	78
		100-1,000	12	0	0	5	58	11	90
		1,000-10,000	11	1	9	11	100	11	100
		10,000-100,000	9	0	0	7	78	7	78
		100,000	3	0	0	3	100	3	100
			116						
Active	33	0	74	0	0	8	11	16	22
		0-100	14	0	0	2	14	6	36
		100-1,000	36	0	0	28	78	32	89
		1,000-10,000	97	14	14	82	82	91	95
		10,000-100,000	93	49	53	90	98	93	100
		100,000	38	33	87	38	100	38	100
			352						

Table 5 • Comparison of positive color changes in bromcresol green dextrose agar (pH 5.0) inoculated with 0.2 cc. saliva and lactobacillus counts of respective specimens of saliva

Lactobacilli per cc. saliva	Number of specimens	Positive color reactions					
		24 hours		48 hours		72 hours	
		Number	Per cent	Number	Per cent	Number	Per cent
0	348	2	0.6	22	6.3	85	24.5
0-100	59	0	0.0	7	11.9	32	54.3
100-1,000	157	5	3.2	47	30.0	111	70.0
1,000-10,000	308	14	4.5	173	59.1	282	91.5
10,000-100,000	667	149	22.3	555	83.2	634	95.1
100,000	497	231	46.6	476	95.5	494	99.3

cal practice. They are based on the general acceptance of the lactobacillus count as an index of caries activity and the close parallel of the Snyder test to these figures despite the fact that two tests measure different things. It is felt that the results of the Snyder test, when used properly, can be translated into useful estimates of caries activity in the manner listed in Table 7.

Thus, the dentist can obtain a practical answer concerning individual caries activity within 48 hours: consistently positive tests in 24 hours will indicate moderate to extreme caries activity, whereas, consistently negative color changes in 48 hours will indicate slight caries activity. The test should be repeated periodically so that the dentist will be aware of a change from a caries-resistant to a caries-active state or vice versa. In a similar way, effective therapy should be measured by a delay in occurrence of positive tests to 48 or even 72 hours. Some object to this interpretation by saying that the test will not indicate a quantitative reduction, let us say, from 75,000 to 25,000 lactobacilli per milliliter of saliva, a change which they feel is of significance. The answer to that objec-

Table 6 • Comparison of color changes in Snyder test agar with lactobacillus counts below and above 10,000 lactobacilli per cc. saliva

Lactobacillus count	Institution	Number specimens	Color reactions					
			24 hours		48 hours		72 hours	
			Number	Per cent	Number	Per cent	Number	Per cent
0-10,000	Michigan	631	14	2.4	133	20.9	180	28.4
	Oregon	872	21	2.4	249	28.5	362	41.5
10,000	Michigan	157	88	52.0	145	92.0	156	99.0
	Oregon	1,144	380	33.4	1,031	90.0	1,128	98.5

tion is that the numbers of the lactobacilli are not so important as the type, and their capacity to produce acid, especially when it is known the lactobacillus count is open to tremendous variation even in the same specimen.[27]

The disadvantage of the Snyder test in clinical use is the necessity for daily observation. This feature has limited its use in survey work by investigators widely separated on successive days. This feature does not apply to the office where it should not impose insurmountable burdens on personnel. It should prove to be a very useful method for screening children in local dental public health programs in respect to individual caries activity. Hartman[28] has reported on its value in such a study of plantation children in Hawaii.

The Snyder test is not the perfect answer to the ideal laboratory test for office work. Further evaluation of the others described, or new ones to be developed, may well lead to its abandonment as a useful laboratory procedure. Until that time, however, it remains the best available laboratory procedure adaptable to private practice to assist in the clinical evaluation of caries activity.

Table 7 • Interpretation of the Snyder test in respect to laboratory estimation of caries activity

Caries activity	24 hours	48 hours	72 hours
Extreme	Positive		
Moderate	Negative	Positive	
Slight	Negative	Negative	Positive
Negative	Negative	Negative	Negative

27. Permar, D.; Kitchin, P. C., and Robinson, H. B. G. Variation in counts of lactobacilli made from single specimens of saliva. J. D. Res. 25:475 (Dec.) 1946.

28. Hartman, F. W. A bacteriologic caries survey method applied to plantation children. J.A.D.A. 36: 53 (Jan.) 1948.

Concurrent Use of a Sulfonamide and Procaine Questioned • The fact that p-aminobenzoic acid and some of its derivatives will inhibit the bactericidal and bacteriostatic effects of the sulfonamides is of special significance because many local anesthetics (e.g., procaine and benzocaine) are esters of p-aminobenzoic acid when placed in the tissues they break down in part into the parent substance. This suggests that the concurrent use of a sulfonamide and benzocaine or related slightly soluble anesthetics in the extraction socket may be an irrational procedure. *From Accepted Dental Remedies, ed. 16.*

Comparative study of local anesthetic solutions in clinic and private practice

Sidney Epstein, D.D.S.; Albert H. Throndson, D.D.S., and J. Leonard Schmitz, D.D.S., San Francisco

In 1945 Winter and Tainter[1] stated, "There is a crying need for further extensive quantitative, critical and objective study of the effect of local anesthetics." This report is an attempt to add a little more to the desired fund of knowledge. Its purpose is to determine how closely studies of local anesthetics made in a typical teaching clinic would correlate with those carried on in private practice. This necessitated consideration of the confusion and disturbances of clinic environment. There was also the problem of comparing data resulting from different technical procedures of several operators as well as the accumulated observations of different observers.

It was decided that since the data were to be collected in our private offices, we would record those observations that would be most important to the dentist in routine surgical and operative dental procedures and generally experienced by him. For purposes of comparison the three principal anesthetic solutions used by Winter and Tainter were used; namely, procaine 2 per cent, epinephrine 1 to 50,000; procaine 2 per cent, nordefrin 1 to 10,000; procaine 2 per cent, tetracaine 0.15 per cent and nordefrin 1 to 10,000. These solutions were supplied, with coded markings, by Cook-Waite Laboratories, Inc., in 2.5 cc. cartridges. Each box of 100 cartridges was designated by a letter. At the completion of the study and after the preliminary records were compiled, the solutions were identified from the, until then, sealed record of the code. Therefore, the method of testing was completely blind.

Records were kept of the site of injection, dental procedures, volumes of solutions used, degree of anesthesia, the patient's subjective reaction, the amount of bleeding, and, where possible, duration of anesthesia and other sequelae.

It is possible in this report on 657 cases to make comparisons with the study by Winter and Tainter, who reported on 2,382 patients, since the test solutions and the standard of reference used are the same.

Certain of the patients' responses, such as blood pressure, respiratory rate and pulse rate, can be measured as fixed numerical values. However, other physical responses such as perspiration, tremor, nervousness and amount of bleeding cannot be measured quantitatively in any convenient way. Therefore, variations in interpretation are seen even when the same solutions are injected and the same

From the College of Physicians and Surgeons, School of Dentistry, San Francisco.

1. Winter, Leo, and Tainter, M. L., A clinical evaluation of local anesthetic solutions of increased strength. Am. J. Orthodontics (Oral Surg. Sect.) 31:307 (May) 1945.

terminology is used to describe the side effects observed.

These data may be influenced greatly by the conditions under which patients are observed. The patient studied in a private office, away from the disquieting atmosphere of the clinic, feels more secure and relaxed. He has time and opportunity to establish some measure of rapport with his dentist. The patient is treated and observed under a more favorable and constant set of environmental conditions. Clinic patients, by way of contrast, are confronted with and confused by all the extraneous and distracting surroundings of a clinic. Different doctors, for the most part completely unknown, impersonal nurses, observers, misinterpretation of frequently overheard remarks excite and enhance the fears of the anxious patient. Thus, one group of patients is constantly reassured and protected in a more passive environment, while the other is exposed to apprehension and fear in an atmosphere of usually intense activity and barely suppressed excitement.

It is our opinion that in all previous studies in clinics where records have been made of patients' blood pressure, respiration rate, and pulse, the only information that is accurately determined is the base line values for the patient before the anesthetic is administered and operative procedures begun. After the introduction of the anesthetic solution, it is not possible to take records rapidly enough to differentiate those changes that are pharmacologic in origin from those that are psychic. A means of recording these constantly changing effects must be developed in order to clearly distinguish between pharmacologic reaction and psychic responses.

As indicated in Table 1, the number of injections made into the several anatomic regions are about the same for the three test solutions. The volume of solution used per injection was the same for all solutions; namely, 1.5 to 2 cc. for conductive anesthesia and 1.0 cc. for infiltration. Winter and Tainter reported approximately 3.6 cc. for procaine-epinephrine and procaine-nordefrin, and approximately 2.8 cc. for procaine-tetracaine-nordefrin. The larger volume of solutions used in the New York study may account for the greater incidence of reactions. The time of onset of adequate anesthesia and profoundness of anesthesia was the same for the three solutions for both surgical and operative procedures. All were effective within four minutes from time of injection in any conductive type of injection, and within two minutes for infiltration anesthesia.

The duration of anesthesia was always

Table 1 • Distribution of types of injections by actual numbers and percentages for each anesthetic solution

Solution	Number of patients	Number of injections	Site of injection							
			Infiltration		Mandibular		Tuberosity		Infraorbital	
			No.	%	No.	%	No.	%	No.	%
Procaine-tetracaine-nordefrin	211	199	54	27.1 ±3.1	85	42.7 ±3.5	58	29.1 ±3.2	2	1.0 ±0.7
Procaine-nordefrin	222	221	71	32.1 ±3.1	90	40.7 ±3.3	59	26.8 ±2.9	1	0.5 ±0.5
Procaine-epinephrine	224	233	62	26.6 ±2.9	101	43.4 ±3.2	65	27.9 ±2.9	5	2.2 ±0.9
Totals	657	653	187		276		182		8	

adequate to complete all ordinary operative procedures. Procaine-nordefrin had the shortest duration so that on occasions the limits of effectiveness were approached. Also, in some instances, the degree of anesthesia was not as profound as with other solutions. However, the procaine-epinephrine and the procaine-tetracaine-nordefrin provide a margin of safety of duration for even slow operators and for unforeseen delays.

There is no need for the long duration of procaine-tetracaine-nordefrin solutions or for other more toxic anesthetic agents for such short procedures as cavity preparations, securing inlay impressions and placing restorations. Prolonged anesthesia serves little or no purpose except in an instance where undue trauma is anticipated. When ordinary operative procedures are completed there is little pain. Though the patient is grateful for the anesthetic during the period of treatment, when the procedure is completed he would like to be free in a short time of the then unpleasant "numb" feeling. Many patients were disturbed by the long period of recovery following the use of procaine-tetracaine-nordefrin. However, in surgical procedures there would be few contraindications to prolonged anesthesia if the agents used are not toxic and do not interfere with the physiologic processes of regeneration.

Our determination on the amount of bleeding was charted on the basis of whether we considered the amount of bleeding normal or excessive. Bleeding was considered to be excessive when it was sufficient to interfere with ease of surgical procedure; that is, locating fragments of roots, bone, foreign bodies, alveoloplasty and suturing. Patients receiving procaine-nordefrin showed a higher percentage of excessive amounts of bleeding in surgical procedures than patients receiving other solutions.

The incidence of other side effects are shown in Table 2. It will be noted that there were no observable adverse responses in from 94 to 96 per cent of the patients and that there was no significant difference among the three solutions in this respect. Perspiration was induced in from 0.9 to 2.4 per cent of the patients.

There is great variation in the interpretation of what constitutes a reaction. Therefore, the incidence of such effects

Table 2 • Comparison of New York and San Francisco statistics on side effects. The values are the percentages of the number of cases with their respective standard errors

Solution	Series	Number of patients	No reactions	Perspiration	Tremors	Embarrassment of respiration	Nervousness	Excessive bleeding
Procaine-tetracaine-nordefrin	S. F.	211	94.3 ±1.6	2.4 ±1.1	1.4 ±0.8	0.5 ±0.5	4.3 ±1.4	1.4 ±0.8
	N. Y.	178 / 561	77.0 ±3.2	0.6 ±0.6	2.8 ±1.2	0	16.9 ±2.8	22.8 ±2.4
Procaine-nordefrin	S. F.	222	96.4 ±1.3	0.9 ±0.6	1.4 ±0.8	0	1.4 ±0.8	5.4 ±1.5
	N. Y.	326 / 133	70.7 ±3.9	0	4.5 ±1.8	0	21.8 ±3.6	14.4 ±2.0
Procaine-epinephrine	S. F.	224	95.5 ±1.4	1.3 ±0.8	2.7 ±1.1	0.9 ±0.6	5.4 ±1.5	4.0 ±1.3
	N. Y.	120 / 330	75.0 ±4.0	3.3 ±1.6	2.5 ±1.4	0.8 ±0.8	15.0 ±3.3	8.4 ±1.6

in the experience of one group of observers cannot be compared with that of others without running the hazard of violently distorting the picture of the comparative actions of the compounds in question. In this study the three solutions were used which were employed by Winter and Tainter in their previously reported series. The criteria for a reaction in the present study were the same as those used by Winter and Tainter and those of Tainter, Throndson and Moose[2,3] who, as a group, previously carried out such studies in San Francisco. Therefore, in these two studies there was a continuity of personnel and presumably of interpretation of the results. The New York study was, however, that of a clinic, whereas our present San Francisco observations are those of private office practice. Table 2 shows the incidence of side effects in the two studies and places the two studies side by side for ease in comparison. In private office practice the number of patients in whom no reactions are seen is materially increased over that of the New York clinical study. However, the relative relationship between the three solutions is the same in the one study as it was found to be in the other. The absolute number of the figures may differ, but within the limits of variation indicated by the standard errors the same relationship in potency and toxicity is observed in the two studies.

Such observations give added weight to the validity of the clinical studies which have been carried out previously, utilizing this general type of technic. We believe that these figures demonstrate that studies made in teaching clinics may reliably indicate the relative values of solutions which are compared aganst one another under our blind test technics as developed by Tainter and his various collaborators. The results of the teaching clinics will apparently underrate the acceptability of a given solution rather than overestimate it, inasmuch as a considerably greater number of patients show no reactions to the anesthetic solutions in the private office than in the clinic.

The present study indicates that of the solutions tried, satisfactory anesthesia will be secured without any reactions in about 19 out of 20 patients. All three solutions give adequate and satisfactory anesthesia. If they are used with discrimination with respect to the type of procedure that is to be employed, we see no reason why they should not be completely satisfactory in substantially every case. The selection among these is to a degree a matter of profoundness and duration of anesthesia desired. It will, in part, also be determined by the physical condition and temperament of the patient, as well as the projected operation.

SUMMARY

A study is presented of three local anesthetic solutions comparing results under the conditions of a teaching clinic with those of private office practice. The standards of comparison and controls were similar. Under both sets of environmental circumstances all solutions were effective anesthetic agents. The significant differences were in the incidence of side effects and volumes of solutions required. The importance of considering the time required for operative anesthesia is discussed. Selection of anesthetic solutions should be suited to the problem at hand. Toxicity of solutions of long duration should be considered.

In this study no evidence was adduced that the use of the longer acting more potent procaine-tetracaine-nordefrin solution was attended by any perceptible increase in the number or intensity of reactions experienced by the patient.

344 Fourteenth Street

2. Tainter, M. L.; Throndson, A. H., and Moose, S. M., Comparison of procaine hydrochloride and procaine borate (borocaine) as local anesthetics. J.A.D.A. 24:376 (March) 1937.

3. Tainter, M. L.; Throndson, A. H., and Moose, S. M., Alleged clinical importance of buffered local anesthetic solutions. J.A.D.A. 26:920 (June) 1939.

Studies on the alterations of development of the teeth and adjacent structures following local administration of chromic phosphate containing P^{32}

M. S. Burstone, D.D.S., M.A., St. Louis

Previous work has demonstrated that radioactive phosphorus, P^{32}, carrier-free, in dosages over 15 microcuries per gram of body weight produces changes in the developing odontogenic and osteogenic structures of the mouse.[1] Since the administration of a soluble P^{32} compound results in total body irradiation it was felt that the problem might be clarified by injecting a small amount of an insoluble radioactive suspension, chromic phosphate, adjacent to the developing mandible and maxilla.

METHODS

The suspension of insoluble chromic phosphate containing P^{32} was prepared according to a modification of the method described by Taylor and Saenz.[2]

Thirty C57 black mice 1 to 4 days of age served as experimental animals. A .05 cc. of a suspension of chromic phosphate with an approximate activity of 1 millicurie per cubic centimeter was injected subcutaneously adjacent to the left mandible. Because of the low penetrating power of beta rays, it was assumed that the left side of the face would receive a larger amount of radiation as compared with the right, thus leaving the latter as a relative control. Additional controls consisted of litter mates of the experimental animals injected with nonradioactive chromic phosphate. Following injection both experimental and control animals were sacrificed at intervals of 8, 10, 14, 29, and 60 days. The heads were removed, fixed in formalin, decalcified in formic acid, stained with hematoxylin and eosin and sectioned serially.

RESULTS

Gross Observations • Seven to 10 days following injection of the radioactive suspension there was a pronounced degree of epilation in the injected area. As the development of the animal progressed a distinct hemiatrophy of the face on the injected side could be observed. Further-

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The P^{32} used in this experiment was supplied by the Oak Ridge National Laboratory on allocation from the Isotopes Division, U. S. Atomic Energy Commission. The radioactive chromic phosphate was prepared by the department of radiochemistry, Washington University.

1. Burstone, M. S., The effect of radioactive phosphorus upon the development of the teeth and mandibular joint of the mouse. J.A.D.A. 41:1 (July) 1950.

2. Taylor, R. M., and Saenz, A. C., The dispersion of P^{32} and other tracers into embryonated eggs. J. Immunol. 63:319 (Nov.) 1949.

more, there was an occlusal imbalance involving the incisor teeth. This resulted in a complete failure of attrition and the incisors continued to grow without being worn down (Fig. 1). The animals treated with the radioactive suspension were, as a rule, smaller in size than their controls.

Microscopic Observations • Eight days following injection the first and second molars were present but there was no evidence of histogenesis of the third molars. The general outline and structure of the first molar tooth was relatively normal except for some osteodentin formation. The ameloblasts adjacent to the coronal portion of the tooth appeared normal while those adjacent to the root portion of the crown were low cuboidal cells. The odontoblastic layer exhibited a similar irregularity toward the root portion of the crown. The pulp was distinctly aplastic. Morphogenesis of the second molar tooth was disturbed with a distortion of the general outline of the tooth. There were some columnar ameloblasts adjacent to the coronal portion, and the remaining cells of the ameloblastic layer were low cuboidal in appearance. There was no intact odontoblastic layer and the entire pulp was filled with irregular masses of osteodentin containing trapped cells which bore some resemblance to osteoblasts. There was a marrow aplasia, the marrow spaces being filled in by a diffuse network of immature connective tissue cells (reticular cells), and there was a diminution in osteoblastic activity (Fig. 2). The apical portion of the incisor tooth exhibited similar changes with a marked scattering of osteodentin throughout the pulp chamber.

The oral epithelium, especially that of the tongue, exhibited a hyperkeratosis, and the rete pegs were absent or considerably reduced in depth. The epithelial cells, especially those of the tongue, exhibited enlarged hyperchromatic nuclei, and in the tongue many of the cells contained bizarre abnormal mitotic figures (Fig. 3). The lamina propria appeared less compact than normal and intercellular edema was pronounced. Areas of mucous and serous salivary gland tissue which were adjacent to the injected radioactive suspension showed the following changes. The mucous type salivary glands appeared relatively normal except

Fig. 1 • Occlusal imbalance of incisor teeth 6 weeks following unilateral injection of radioactive chromic phosphate

for a slight acinar swelling. The serous salivary gland tissue appeared shrunken and the cells were more intensely stained.

Fourteen to 17 days following injection the pulps of both first and second molar teeth were aplastic and exhibited some pyknotic nuclei. There was a consolidation of the osteodentin in the pulp chamber of the second molar. The first molar exhibited a failure of root formation with a sealing off of the root portion of the tooth by osteodentin. The adjacent bone was poorly formed and showed prominent cement lines. Some areas of basophilic staining fibrous bone were also present. The marrow was still aplastic and consisted of a loose network of large fibroblasts and a scattering of macrophages and heterophil leukocytes (Fig. 4 left and right). A few foci of heterophil leukocytes were present in the adjacent soft tissue. The oral epithelium, especially that of the tongue, was still hyperkeratotic. However, only a few of the cells ex-

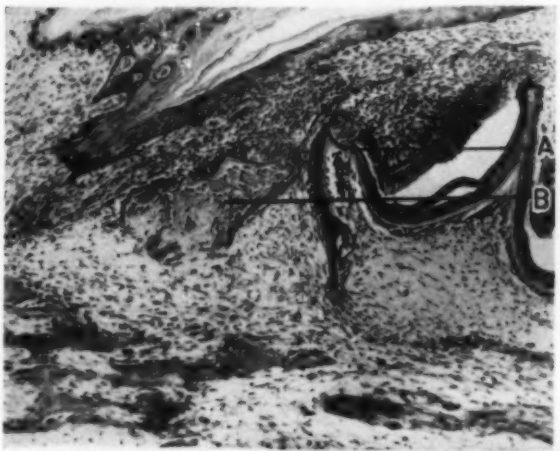
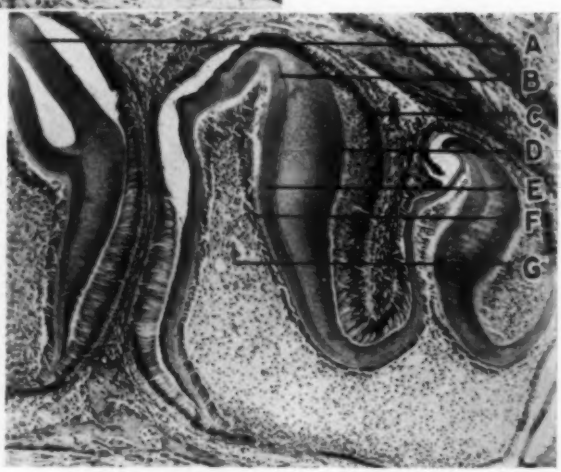


Fig. 2 • Left: A, first molar tooth of 9 day old mouse, 8 days after chromium injection. There is extensive osteodentin formation throughout the pulp chamber of the second molar tooth



Right: A, part of first molar tooth, and B, second molar tooth, of opposite side of the jaw of the same animal as in Fig. 2 left. C, ameloblasts; D, enamel matrix; E, dentin; F, odontoblasts; G, pulp

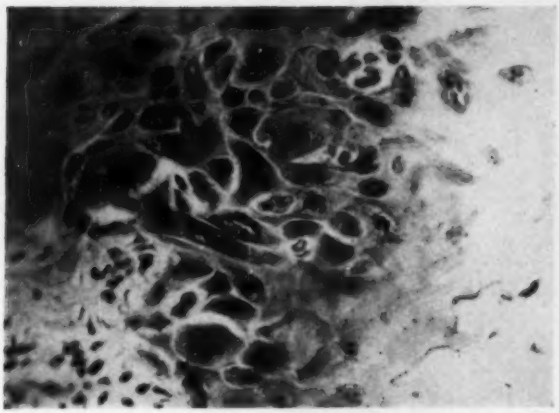


Fig. 3 • Epithelium of tongue 8 days following injection of radioactive chromic phosphate, showing abnormal mitotic figures and enlarged hyperchromatic nuclei

hibiting hyperchromatic nuclei were present and no abnormal mitotic figures were visible.

The adjacent salivary gland tissue exhibited changes similar to those observed at seven days following irradiation with the following changes. The serous acini were unchanged while some of the mucous acini were enlarged to enclose a cystic cavity. The cystic areas exhibited a squamous metaplasia and contained a few inflammatory cells and keratin-like debris (Fig. 5).

Thirty days following injection the first and second molar teeth had erupted into the oral cavity and there was considerable apposition of dentin. However, root formation had not progressed beyond the previously described postirradiation stage. The pulp tissue, especially that of the first molar, was relatively acellular and contained a scattering of pyknotic nuclei and an even greater amount of pink-staining cellular debris in a fibrinous network. The adjacent bone was poorly developed and exhibited prominent cement lines, and the marrow contained proliferating fibroblasts and heterophil leukocytes.

The oral epithelium showed a normal degree of keratinization and the individual cell structure was normal. However, the rete did not exhibit its characteristic symmetry and the basal layer was less distinct than normal. The interdental papillae between the first and second molars were necrotic, and their connective tissue base was infiltrated by heterophil leukocytes. The mucous glands which had undergone a cystic change had enlarged and contained an increased amount of keratin. The small foci of heterophil leukocytes previously described had enlarged and coalesced in the adjacent soft tissue.

Two months following injection there was still no evidence of first and second molar root formation and the crown was ankylosed to the underlying alveolar bone by a secondary cementum (Fig. 6). The fibrous connective tissue in the marrow spaces had collagenized in some areas. In addition, the marrow contained foci of heterophil leukocytes and also, areas of basophilic staining debris measuring about 30 microns in diameter. These soft tissue changes closely paralleled those of the previous stage except for an increase in size of the abscess areas.

SUMMARY AND CONCLUSIONS

Injection of suspensions of insoluble chromic phosphate containing P^{32} adja-

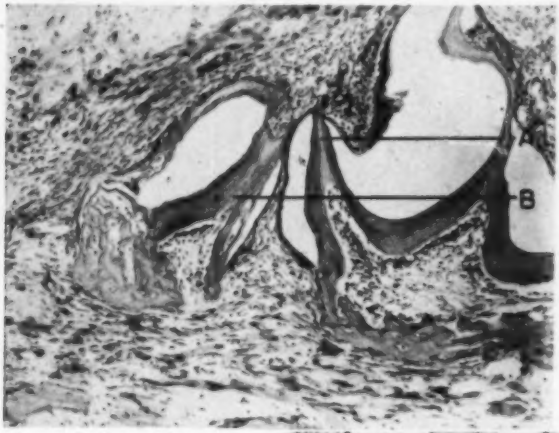
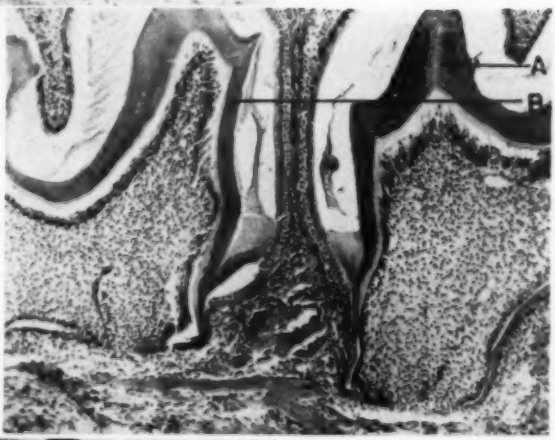


Fig. 4 • Left; A, first molar tooth, and B, second molar tooth, of a 15 day old mouse, 14 days following injection. Shows failure of root formation



Right: A, first molar tooth, and B, second molar tooth of normal 15 day old mouse

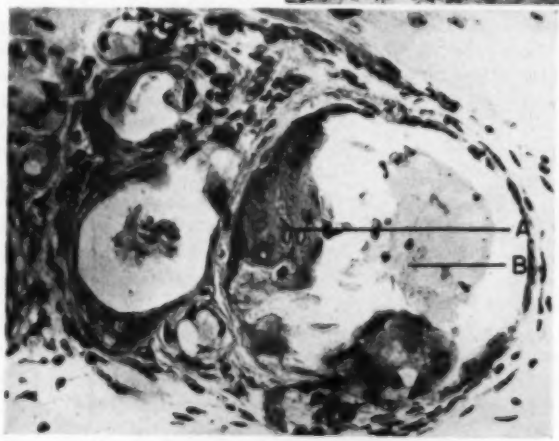


Fig. 5 • Cystic change in area of mucous glands. A, squamous type cells; B, keratohyalin debris

Fig. 6 • A, shows injected side of animal two months following injection; B, opposite side of same animal. Note failure of root formation on the injected side

cent to the developing jaws of the mouse produced changes in histodifferentiation and morphodifferentiation of the dentition. These changes included the differentiation of squamous type cells in the ameloblastic layer instead of the normal columnar type, formation of osteodentin associated with abnormal odontoblasts and formation of osteodentin in the pulp chamber. There was a failure of root development even though there was continued apposition of the coronal dentin. Marrow aplasia and subsequent fibrosis of the alveolar bone together with formation of immature fibrous bone were characteristic changes. The alterations in development were qualitatively similar to those produced by systemic injection of soluble radioactive phosphorus solutions. Areas of oral epithelium including that of the tongue adjacent to the injected region exhibited epithelial cells with greatly enlarged hyperchromatic nuclei. Some abnormal mitotic figures may be present 8 to 15 days following injection. The serous salivary glands were more radiosensitive than the mucous type glands although areas of mucous glands may show a cystic change together with a squamous metaplasia.

The deterioration of human teeth

Peter J. Brekhus, D.D.S., Minneapolis

Given only the methods known at present for preventing the loss of human permanent teeth, can those teeth be saved? Or is there a force at work, an evolutionary or degenerative force, that is slowly but surely eliminating certain teeth from the human dentition?

Workers at the School of Dentistry of the University of Minnesota are asking these questions as the result of their findings in three successive studies that began 20 years ago. These findings are portrayed in Figure 1.

The 3,388 freshman students, both men and women, who entered the University of Minnesota in 1929 averaged 9.95 teeth affected by dental caries.[1] The 4,348 students who entered 10 years later, in 1939, had 11.8 teeth so affected.[2] The 4,412 who came to the University in 1949 averaged 13.7 teeth affected by caries. All differences are statistically significant.

Though started only 20 years ago, these decennial reviews of the dental condition of university freshmen really cover a period of approximately 40 years. The young people who entered the University in 1929 at an average age of about 19 years were born in 1910 or thereabouts. The period since that time has produced more benefits for dental health than any other period in the world's history. Nutrition, particularly among the American people, has greatly improved. Dental hygiene has become an almost universal practice, at least by the majority of persons in the higher socioeconomic levels to which university students belong. Dental health education has been carried on at a constantly accelerating rate since 1910, and its emphasis has been increasingly on the desirability of early and frequent dental care to prevent the deterioration and loss of teeth.

Nor has all this good advice been disregarded by the public. The teeth of most of these university students had been given good care. These young people keep their teeth clean and they go to their dentists to obtain fillings and other repairs or replacements when these are needed. The point is that they are needed. Despite all the care and attention that has been and is being given to the teeth of university students, these teeth are now decaying to a greater degree than they were 10 years ago and a still greater degree than they were 20 years ago.

The majority of permanent teeth included in the 1929 study were in process of formation between 1910 and 1919; those of the 1939 study between 1920 and 1929; those of the 1949 study between 1930 and 1939. What influences may have been at work during those periods

Professor Emeritus, School of Dentistry, University of Minnesota.

1. Brekhus, P. J., Report on dental caries in 10,445 university students. J.A.D.A. 18:1350 (July) 1931.

2. Brekhus, P. J. A second census of dental conditions in University of Minnesota freshman students. J.A.D.A. 28:1126 (July) 1941.

to influence the caries susceptibility of children's permanent teeth?

The first period included World War I. Possibly a slightly less than optimum degree of nutrition was enjoyed by some of the children who grew up during that period, but to offset this there was a reduction in sugar intake due to the restrictions of the war years. The second period, 1920 to 1929, was the most prosperous in our nation's history—the era of the two chickens in every pot. The third period, 1930 to 1939, included the depression years, when nutrition may have been reduced to some extent, but hardly to a degree that would have interfered with the normal development of children in the group represented by university students. Nor did the conditions of either World War I or the depression affect adversely the general health of these youngsters.

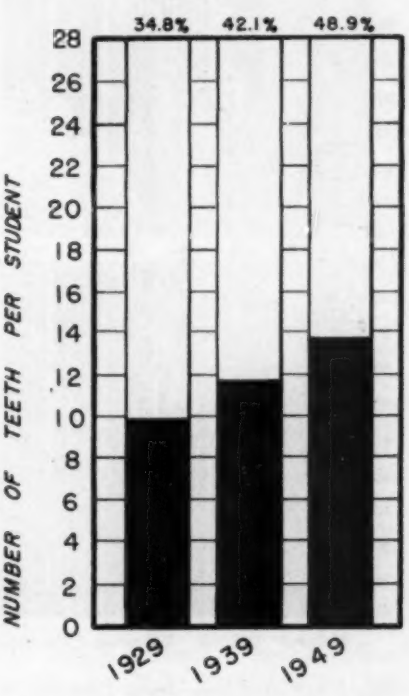


Fig. 1 • Average number of teeth per student affected by dental caries; 1929 (3,388 student, 9.95); 1939 (4,348 students, 11.8); 1949 (4,412 students, 13.7)

Table 1 • Comparative mean heights and weights of University of Minnesota freshman students, 1929, 1939, and 1949*

Year	Men		Women	
	Height in inches	Weight in pounds	Height in inches	Weight in pounds
1929	68.64	142.45	63.48	123.01
1939	68.87	147.75	64.36	124.44
1949	69.57	153.80	64.45	126.30

*All differences are statistically significant.

Table 2 • Dental findings for the three groups of freshmen

Year of examination	Number of freshmen	Average no. fillings per student	Unfilled carious lesions	Number extractions per student
1929	3,388	7.837	1.245	.7077
1939	4,348	8.858	1.439	.7812
1949	4,412	11.410	1.213	1.1124

The students of 1939 rated a little better in general health than those of 1929. They were a little taller and a little heavier than their counterparts of a decade earlier. Yet they had more tooth decay.[3] The weights and heights of the 1949 freshmen show a similar increase over those of 1939, as shown in Table 1.

The dental findings for the three groups of freshmen, a little more in detail, are shown in Table 2.

A definite pattern is shown in the degeneration of teeth as shown in Figures 2 and 3 as represented in these three large groups of students, and exactly the same pattern is evident in all three groups. Exclusive of the third molars, which were not included in the records, the teeth most affected by caries are the first

3. Brekhus, P. J., Your Teeth—Their Past, Present, and Probable Future. Minneapolis: University of Minnesota Press, 1941, p. 31.

molars, next the second molars, then the second and first bicuspids. Little decay is found in the cuspids and only a negligible amount in the lower incisors.

This pattern differs in certain respects from the one found in recent studies of congenitally missing teeth.[4] The teeth most frequently found to be congenitally absent are the third molars, the upper laterals, and the second bicuspids. These observations suggest that some force which is not yet understood may be at work in reducing the number of human teeth. The human dentition may be undergoing a process of gradual change. A few centuries hence the majority of people may have no molars, and their bi-

4. Brekhus, P. J.; Oliver, C. P., and Montelius, George. A study of the pattern and combinations of congenitally missing teeth in man. J. D. Res. 23:117 (April) 1944.

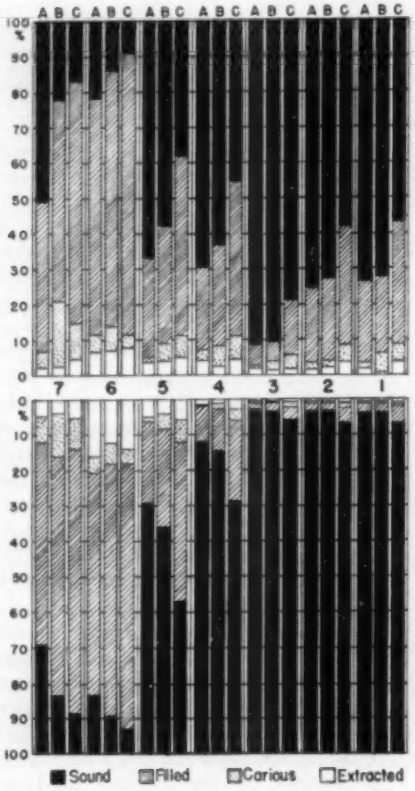


Fig. 2 • Comparative dental conditions in right half of dentitions of male freshmen who entered the University of Minnesota in 1929, 1939 and 1949. Columns labeled A represent conditions in 1929; those labeled B, 1939; and those labeled C, 1949

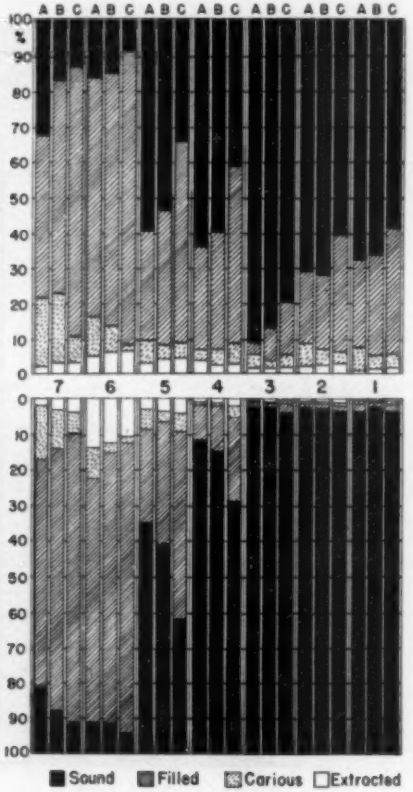


Fig. 3 • Comparative dental conditions in right half of dentitions of female freshmen who entered the University of Minnesota in 1929, 1939 and 1949. Columns labeled A represent conditions in 1929; those labeled B, 1939; and those labeled C, 1949

cuspids and upper lateral incisors may be following the molars into oblivion.

In the 1929 group of university freshmen there were 3,388 individuals, of whom 61, or about 1.8 per cent, had teeth entirely unaffected by caries.[1] In the 1939 group, consisting of 4,348 students, there were only 51 who showed no evidence of caries, about 1.15 per cent.[2] In the 1949 group, consisting of 4,412 students, only 30 had perfect teeth, a percentage of 0.68. And this so-called "perfection" refers only to the absence of caries. It does not take into consideration congenitally missing teeth, periodontal conditions, the degree of occlusion or any other factors that should properly be included in evaluating the condition of the teeth.

Few significant differences were found between men and women students in any of the three studies. In all three groups of students, the degree of deterioration was somewhat greater among women than among men. The total number of affected teeth in the three groups are shown in Table 3.

Table 3 • Total number of affected teeth in the three groups of freshmen

Year of examination	Total fillings	Total caries	Total extractions	Total DMF* conditions
1929	26.552	4.217	2.398	33.167
1939	38.516	6.258	3.397	48.171
1949	50.341	5.352	4.908	60.601

*Decayed, missing, or filled.

With the single exception of untreated caries in 1949, every one of these evidences of deterioration of teeth by decay shows an increase as time goes on.

It is apparent that, despite all the numerous scientific advances of the modern age, the dental benefits available remain just a step or two behind the force or tendency that is working steadily and slowly against all the efforts to prevent the loss of human permanent teeth. With the present extensive use of fluoridated drinking water, the topical application of sodium fluoride to children's teeth and the widespread use of ammoniated dentifrices, it is possible that the next 10 years will show a reversal of the present tendency. If such a reversal occurs, will it be permanent or only temporary? Only a continuance of these studies will answer that question.

It is hoped that the studies will be continued. Such recordings, at 10 year intervals, of the dental conditions of large groups of healthy young people from the top economic levels, can be of inestimable value in plotting long-term trends and in indicating the effects of various factors that may enter into the picture from time to time. Thus they serve, for teeth, a purpose similar to that served by the 10 year censuses of the total population and the death rates for that population. Though those who contributed to the present study may not be here to see the findings of the next 40 years, the chart that will show the degree of dental deterioration over a half century will constitute an invaluable record for future generations.

The present report is not presented in a spirit of pessimism. Even though there does seem to be a trend toward the reduction and deterioration of human teeth, that tendency is not necessarily irreversible. And, even if it cannot be reversed, it may indicate merely that a portion of the human anatomy that is no longer of very much use is on its way to disappearing, like the vermiform appendix at present and the caudal appendage of the past. Moreover, the findings of these three successive studies should serve as a challenge to both dental research workers and practicing dentists. If teeth are worth saving, it must be these groups that will find and apply the means of saving them.

University of Minnesota

The temporomandibular syndrome as related to full denture prosthesis

Louis S. Block, D.D.S., Louisville, Ky.

The temporomandibular syndrome has relations to every branch of dentistry. While today it is thought of primarily as one of the many manifestations of malocclusion, it was not always so clearly understood. For years the syndrome was understood only as it bore relationship to the closed bite.

Attention of the dental profession was first directed to the closed bite, and its accompanying symptoms, through worn out artificial dentures and the accompanying resorption of underlying tissues. Stories were told of deaf patients whose hearing was restored simply by the insertion of new dentures which opened the bite. Later itinerant salesmen taught that, in a closed bite case, the condyles shifted backward and closed the external auditory canal, causing deafness, and that pain in the joint might indicate a hole worn in the meniscus. Dramatic case histories were described. Audiometric measurements were suggested in all closed bite cases. Otolaryngologists sent patients to dentists with instructions to raise the bite 3, 4 or 5 mm. Technics by the score were given, teaching exact methods of increasing the vertical dimension. All of the ideas mentioned, whether or not they have stood the test of time and experience, have helped dentistry to reach the present conclusion that the temporomandibular syndrome should be considered one of many symptoms of malocclusion, and that the principles involved in its correction are no different in the edentulous mouth from those found in a mouth with all or some teeth present.

The temporomandibular syndrome should not be classed as a subject to be considered alone, but it should be considered as one phase of the comprehensive field of occlusion. One of the few exceptions to this rule is the case of accidental injury to the joint, followed by trismus and pain, even though the occlusion may be satisfactory. Falling in this category too, is the case where the mallet and chisel are used with great force in removing an unerupted lower third molar. If the patient or dental assistant will support the mandible against these blows some mysterious jaw pains, neuralgias and otalgias will be prevented. Also excepted is the arthritic joint that is not associated with malocclusion but which is relieved by changing the bite.

In spite of the many minor controversies over interpretation of symptoms and the wide variations in methods of correction the temporomandibular joint syndrome and its treatment has had a rapidly

Read before the Section on Full Denture Prosthesis, ninetieth annual session of the American Dental Association, San Francisco, October 19, 1949.

increasing appeal and acceptance by the dental and the medical profession.

Ten or fifteen years ago patients wearing old overclosed dentures, complaining of pain in one or both temporomandibular joints, a tight, stuffy sensation in one or both ears, and occasional tinnitus, were treated in my office as follows:

After an exhaustive history was taken, roentgenograms were made of both temporomandibular joints with the old dentures in place and the teeth closed. The roentgenograms usually showed one or both condyles displaced posteriorly. In some cases the old dentures were built up temporarily. This was done with heavy compound reliners or with silver splints cast to fit over the denture teeth. The roentgenograms made in the opened trial position sometimes revealed that the condyles had moved forward and sometimes they had not. Some dentists believed that the bite was not restored to normal and that the treatment was incorrect unless the roentgenograms of the new jaw relation showed the condyles to be in the position as defined as normal; that is, unless the superior anterior portion of the condyle head was in apposition to or articulating with the inferior posterior surface of the eminentia articularis (Fig. 1). I feel that this was an erroneous requirement for the correction of malocclusion. I believe that occlusal interferences, such as premature contacts and abnormal inclined planes, should be removed. If an acceptable vertical dimension remains it should not be disturbed. If an acceptable vertical dimension is lost, it should be restored with a diagnostic temporary appliance. Then the muscles that influence mandibular movement and position will be allowed to guide the jaw to proper centric relation. Immediately after the correction is made the temporomandibular joint roentgenograms may show very little or no positional change from the first or incorrect position. This lack of change may be the result of trismus or muscular tensions which have existed for considerable time because of malocclusion.

Fig. 1 • Temporomandibular joint in normal position. When the teeth are closed in proper centric occlusion the superior anterior surface of the condyle head articulates with the inferior posterior surface of the articulator eminence

The new or diagnostic position may be considered a position of rest, or at least a position that will reduce strain on the joint. This new position not only may assist in gradually reducing trismus of the muscles but it may allow inflammatory changes within the joint to subside. Anatomists state that malocclusions which cause abnormal joint movement and position may cause inflammation and even degenerative conditions within the joint. With such conditions present, plus muscular tension, it should not be expected that the roentgenogram will disclose a normal positioning of the temporomandibular joint very soon after correction is attempted. Consequently, I am guided by the clinical picture for some time after correction is made and do not roentgenograph the temporomandibular joint again until I believe permanent correction is indicated.

Changes in muscular tensions and in freedom of jaw movement make it necessary that in the treatment of edentulous patients the dentist must be certain that the muscles are relaxed and that inflammation is reduced before he attempts to

correct the intermaxillary relation. Hot packs applied to the jaws, sedatives and giving the patient a soft or liquid diet will assist the dentist to determine proper centric relation at an acceptable vertical opening. In the treatment of immediate replacement denture cases the greatest opportunity for error lies in the acquired functional bite which the patient has achieved through years of abnormal chewing and the resultant uneven wear of his few remaining natural teeth. These teeth usually will have inclined planes so badly worn that, on closing, they force the mandible to an eccentric position. Therefore, it is dangerous to accept the patient's functional bite, one that is made by the patient simply closing the worn teeth into occlusion. Instead the operator should be cautious, work on a relaxed patient, recognize eccentric movements and avoid them by doing selective grinding, or by opening the bite sufficiently with biterims (Fig. 2). These precautions will help to restore proper normal jaw relations.

Much publicity has been given to cases in which patients have had their hearing restored through the use of new dentures or by having their bite raised. Such publicity has been extremely embarrassing to me and to the entire dental profession. In my 22 years of practice, 17 of which have been devoted primarily to prosthetic dentistry and occlusal problems, I have seen only one type of deafness which showed improvement after bite correction, and I am not certain that an otolaryngologist would call this type a true deafness. I speak of those patients who complain of a stopped, stuffy sensation in the ears, and some hearing loss, and who report some relief in hearing after the eustachian tubes are inflated. Some of these patients also report considerable improvement in head and ear comfort after correction of the bite. I am one of these patients. I formerly wore splints whenever my ears stopped up or began to roar. The splints helped me. However, when I began studying how to relax my patients prior to occlusal correction or prior to obtaining centric relation I found myself relaxing too. In the past two years I have been healthier and more relaxed than ever before and I have had no temporomandibular joint symptoms even though I have a deep overbite, a slight premature contact in the molar region, and the condyle heads are in the extreme posterior part of the glenoid fossae when my teeth are in centric relation.

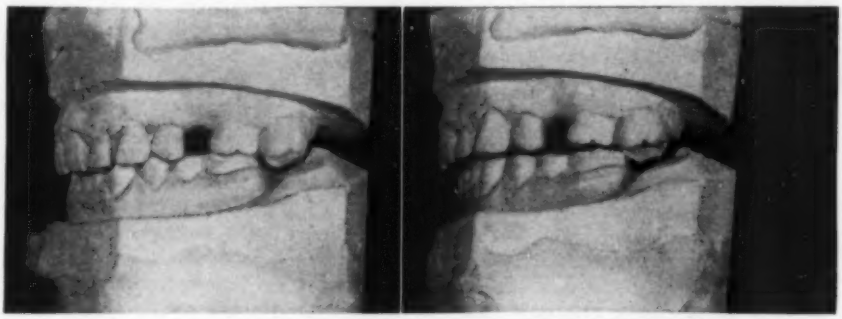


Fig. 2 • Left: Casts of upper and lower teeth occluded according to erroneous centric relation acquired by the patient. Right: Same case, mounted in proper centric relation after patient relaxed

However, the condyles do not go to the posterior part of the fossae as often as do those of a nervous, tense person. The fact that I no longer need splints may be explained by assuming that my mandible is in physiological rest position most of the time when I am relaxed.

Tenderness to palpation of the joints or painful movement within the joint indicates inflammation and possibly some degenerative change. In either event the pain comes from trauma to a nerve. The only sensory nerve within the temporomandibular joint is the auriculotemporal nerve or its terminal branches. An overbite or an uneven occlusal contact in closed position causes some shifting of the condyle head within the fossa. This shifting is usually upward or backward, or both. It may be unilateral or bilateral. This change in joint position may cause pressure on an articular branch of the auriculotemporal nerve, on the pad of connective tissue which protects the terminal branches of that nerve or, as some anatomists believe, on the auriculotemporal nerve itself. Regardless of which interpretation is correct, the resulting sensation of pain would be the same. There are many branches of the auriculotemporal nerve outside the glenoid fossa, therefore the shifting and pressure within the fossa could explain some of the neuralgias referred to the other regions of the head, face and neck that are characteristic of the temporomandibular joint syndrome. These referred neuralgias usually disappear when the malocclusion is corrected.

I have purposely made no mention of the term "repositioning of the mandible," because it implies that the operator selects the correct position of the mandible for the patient. Now that I have come to recognize the importance of muscular tensions and trismus I realize that the muscles, when given freedom and proper opportunity, will determine the correct position for the patient. In some cases and with some technics the operator establishes the position, and maintains it by grinding the inclined planes or cusps. In such cases it is possible by some stroke of good fortune to arrive at the correct position. If the correct position is not determined, however, and the teeth are built or ground to incorrect relation, either the teeth, the underlying structures, or the tissue within the joint will have to yield. A number of anatomists and dentists who have studied this subject suggest that the shifting of the mandible caused by occlusal disharmonies can wear a hole in the meniscus. This is difficult to demonstrate but it undoubtedly can and has taken place. This extreme condition which causes pain and abnormal joint movement need not occur. However, even if the cause of the pain were known it is doubtful that the treatment of the condition would be any different. The patient would be relaxed, the centric relation restored and the vertical dimension changed only if necessary.

Many physicians have demonstrated an appreciation of the dentist's efforts to give relief to temporomandibular joint syndrome patients. Since the treatment of occlusal disharmonies is so distinctly a dental subject it has been difficult to present the subject to physicians so they can understand it as do dentists. Most physicians recognize overbites, closed bites, and the classic symptoms of the syndrome, but they do not recognize the delicate diagnostic points of premature occlusal contacts. That is why I do not like to refer patients to a medical roentgenologist for temporomandibular joint roentgenograms. He seldom knows whether the patient is biting in centric, right or left lateral or protrusive relation when he takes the picture in the closed position. Only a skilled dentist can detect that point. Nevertheless, some dentists refer their patients to a medical roentgenologist who most likely has his nonmedical technician take the pictures. Nearly every temporomandibular joint roentgenogram taken by a medical roentgenologist or technician

which I have seen is a good clear shadowgram of the joint. The interpretations, however, have all followed the same pattern. I have never read a report that was of any real value beyond a description of the joint surfaces. By simply reporting "joint spaces normal" the roentgenologist does not indicate whether the jaws of the patient are in centric, protrusive, or lateral occlusion. If dentists are to benefit from temporomandibular joint roentgenography they must take the time to master the technic of taking the pictures.

Occasionally a case is seen in which the arthritic joint limits the movements of the mandible and even these limited movements are exceedingly painful. The patient usually complains of arthritis in other joints. A roentgenogram of the temporomandibular articulation usually shows changes in the articular surfaces. Pain makes it practically impossible to relax the patient enough to learn much about the opening component or centric relation. There may be crepitus within the joint and any movement causes additional pain. A period of rest should be given the joint, and a liquid diet, hot packs and sedatives prescribed for the patient. An empirical arbitrary increase in vertical dimension, within physiologic limits, if it is possible to determine this, usually will give the patient some relief. In cases of this kind the dentist treats subjective symptoms and he is unable to incorporate what he has learned of rest position and needle point tracings. By opening the bite, or in some cases, by simply removing one or two interfering occlusal contacts he shifts the condyle head (on closing) from a pain-generating area to a non pain-generating area. I have had four such patients. Two are completely edentulous.

One patient, confined to a wheel chair, has arthritis in her hands, feet and temporomandibular joints. Every two or three years I rebase or make new dentures for her to prevent a return of the crepitus and pain. Her general condition does not improve but she is able to masticate her food. The anatomists, the pathologists and the physiologists may disagree over the reasons for the relief of this pain but that is not important to the clinician. The open-minded orthopedist is glad to have help from the dentist. However, I am anxiously awaiting the advance of medical science to the point where the treatment of other pathologic articulations can be as successful as is the treatment of arthritic temporomandibular joints.

Another patient, a middle aged woman, suffered with severe arthritis. She, like many others, had visited various clinics and sanitariums. She now wears two tightly fitting uncemented silver splints on her lower teeth. Sometimes they feel uncomfortable so she removes them. At other times she feels more comfortable with them in place (Fig. 3). She is guided by her own discomfort and not by the dental concept of centric relation or hinge axis. She has been able to eat in comfort for five years, sometimes with and sometimes without splints, although she seldom has been able to walk or raise her arms.

Roentgenograms of a third patient disclosed erosion of one condyle with only a pointed spine remaining. Pain on movement of the condyle was excruciating. The old dentures were overclosed and unstable. New dentures were made which required more guesswork than usual to determine the normal vertical opening and centric relation. The new dentures brought about a remarkable improvement in the condyle surface in less than six months (Fig. 4).

The fourth patient has suffered from a severe arthritic condition for 15 years. Her hands and wrists are badly distorted. Crepitus in the temporomandibular joint prior to treatment was so severe that she could open the mouth less than one-fourth inch in the bicuspid region. Upper and lower partial dentures were indicated. Heavy sedation and heat were prescribed and the jaws forced apart so that impressions could be taken. Partial

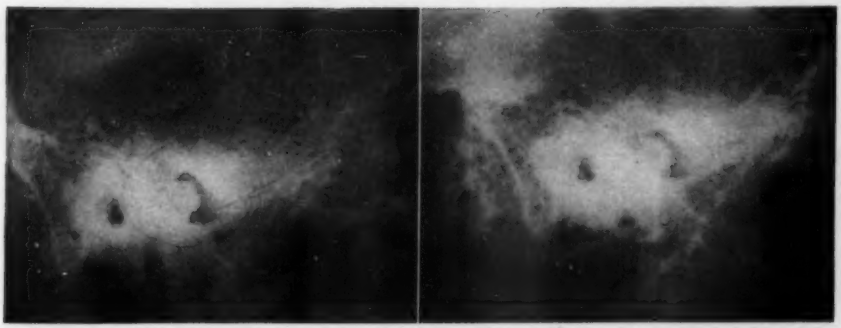


Fig. 3 • Left: Left temporomandibular joint, without splints. Note changes in the surface of the condyle head. Right: Same joint with splints in position

dentures were inserted, opening the bite possibly 2 mm. This slight change of joint position relieved the acute pain and relaxed the muscles sufficiently to enable the patient to open her mouth over one-half inch in the bicuspid region (Fig. 5). This case dates back 12 years and has needed constant attention because of periodontal complications. During the past year a complete upper denture was made for this patient.

The temporomandibular joint syndrome cannot be discussed thoroughly without considering the neurotic patient. An attempt to cover this phase of the subject was made by Elam Harris and me in the second edition of Swenson's[1] *Complete Dentures*. One paragraph is quoted here:

> Many patients present in such a nervous state that it is difficult to determine whether the symptoms are real or apparent. The neurotic individual seeks relief from magnified pain and discomfort and in search of this may turn to dentistry. Consultation with a psychologist or psychiatrist is advisable and may be necessary before relief is obtained. The alert, well informed dentist will demand such a consultation. This highly sensitive and nervous individual, frequently one in a meno-

1. Swenson, Merrill G., Complete Dentures, ed. 2. St. Louis: The C. V. Mosby Company, 1947, p. 58.

Fig. 4 • A: Eroded condyle, only pointed spine remains. B: Two months later, after new dentures had changed position of the condyle. Eroded area being refilled. C: Four months after first picture was taken. Note complete new surface of condyle head

Fig. 5 • Left: Left temporomandibular joint, closed position. Right: Right temporomandibular joint, closed position

pausal state, is among the most difficult and perplexing types presenting with the temporomandibular syndrome. The dentist may restore proper intermaxillary relations and balanced occlusion only to find the patient back a few days later complaining that the teeth hit on one side only. It is at this time the operator must use the most caution and be certain the malocclusion is not caused by trismus resulting from tensions characteristic of the mental state of many hypochondriacs. If this point is overlooked and the patient is catered to, that is, the high points immediately ground to where the teeth hit equally on both sides, then it may be only a matter of minutes or hours until the patient is greatly upset over hitting now on the other side of the arch. Once this state has been reached the patient will never again give the dentist peace. There will always be fixed in the patient's mind an idea that the occlusion should not have been touched and that the dentist has ruined the case and must now start over. It is true that a patient once corrected of occlusal abnormalities becomes more sensitive to slight change in the occlusion than before any correcting was done. Therefore when the patient returns, complaining of hitting on one side only, it is suggested that the routine of wet heat to the jaws, liquid diet and mild sedation be administered for a few days to rule out trismus before any grinding is done. This category of patients seldom find any permanent relief from dental care, or in fact from any professional service until the neurosis is passed, requiring in many cases physiological or psychiatric care. Regardless of what they are told, these patients have a fixation that all their physical difficulties could be easily eliminated if the dentist would only obey their instructions and trim off the offending high points in the occlusion.

Some dentists prefer to restore vertical dimension gradually in several treatment stages believing that the patient cannot tolerate the full and complete restoration at one step. This attitude indicates a misunderstanding of muscle behavior and physiology. The sooner an acceptable vertical dimension is established the sooner the muscles will find their true equality of tension, and the mandible its proper position in relation to the maxilla.

Except in arthritic cases the following may be considered my concept of the treatment of the temporomandibular joint syndrome: Remove all occlusal interference and muscular tension and restore and maintain centric relation. If symptoms persist seek the cause elsewhere. It is possible that the temporomandibular joint syndrome may be ruled out.

774 Starks Building

Toothbrushing as a substitute for quick cleansing in the topical fluoride technic

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The topical application of a 2 per cent solution of sodium fluoride to the teeth of children has become a generally accepted preventive measure for the partial control of dental caries.[1] In the usual fluoride technic,[2] a cleansing or quick prophylaxis is recommended. However, in public health preventive programs where large groups of children receive topical applications of sodium fluoride, the recommended prophylaxis places financial and time limitations on the project.

In view of these limitations, the Bureau of Public Health Dentistry of the Illinois Department of Public Health, with the assistance of the United States Public Health Service demonstration unit, conducted a study in Edwards County, Illinois. The study was made to determine whether brushing the teeth for two weeks under the supervision of a classroom teacher could be substituted for the cleansing or quick prophylaxis recommended before the first application of sodium fluoride without decreasing the effectiveness of the treatment. A secondary purpose of the study was to confirm the findings of other research agencies,[3] that sodium fluoride, topically applied, will reduce expected dental decay 40 per cent.

TYPE OF COMMUNITY

Edwards County was selected for the study because it is a rural area where no fluorides appear in the drinking water and where the chances for the use of ammoniated dentifrice or other preventive treatments would be least. Further, the future need for establishing topical fluoride programs in rural areas will persist even though fluoridation of drinking water in urban areas becomes an accepted practice.

The population of Edwards County is comparatively static, composed of all white European descendants who have resided in the area for two or three generations. In selecting a study area, it appeared that the variable factors involved in this typically rural county would be comparable for all groups with the possible exception of those within the city of Albion, which is the most urban section. The most rural section has a large number of small schools where several grades are taught by the same teacher, whereas the more urban sections have consolidated schools and individual teachers for each grade.

Director, Division of Public Health Dentistry, Illinois State Department of Public Health.

1. Council on Dental Therapeutics. Accepted dental remedies, ed. 15. Chicago, American Dental Association, 1950, p. 56-7.

2. Knutson, J. W.; Armstrong, W. D., and Feldman, F. M. The effect of topically applied sodium fluoride on dental caries experience. IV. Report of findings with two, four, and six applications. Pub. Health Rep. 62:425, (March 21) 1947.

3. Galagan, D. J., and Knutson, J. W. The effect of topically applied fluorides on dental caries experience. V. Report of findings with two, four, and six applications of sodium fluoride and lead fluoride. Pub. Health Rep. 62:1477 (October 10) 1947.

The county was divided arbitrarily into three geographical areas composed of a comparable number of school children, identified in this study as groups. Elementary school children whose ages ranged from 6 to 12 years were included in the original groups. At the completion of the one-year study period these same children, comprising the groups, had advanced to ages 7 to 13.

Children in Group 1 were given inexpensive small toothbrushes and a tooth powder that has no known caries inhibiting effect. The formula of the powder is as follows:

Soluble saccharin	20 Gm.
Menthol	20 Gm.
Calcium carbonate .....9,960 Gm.	
Oil of peppermint—pure	20 cc.
Oil of wintergreen—pure	60 cc.
Oil of cinnamon	19 cc.
Sulfocolaurate	100 Gm.

Under the instruction of a dental health educator, each class was taught the rotary method of brushing the teeth, emphasizing the short, light, rotary movements of the brush, especially for the areas nearest the gum margins and the occlusal surfaces. Teachers were instructed to hold classroom toothbrush drills twice daily, immediately after school convened in the morning and after the lunch period.

EXAMINATION AND TREATMENT

At the end of two weeks of supervised toothbrushing the initial examination was made which consisted of charting all decayed, missing and filled permanent teeth including unerupted permanent teeth. Unerupted teeth were designated by a different marking to distinguish them from teeth that had been extracted or lost by accident. Teeth that were unattacked by caries received special attention in that this study was primarily concerned about what happened to these teeth during the study period.

The equipment used in the examinations and treatments was a portable dental chair, Castle light, air compressor, clear plain mouth mirror, sharp explorer, cotton roll holders, cotton rolls, a 2 per cent aqueous solution of sodium fluoride and cotton-tipped swabs. The dentist making the examinations had had considerable experience in previous surveys such as the Galesburg-Quincy and Aurora-Peoria studies.

Immediately following the examination the first application of sodium fluoride was made in the following manner: the teeth were isolated with cotton rolls, dried with compressed air, swabbed with a 2 per cent solution of sodium fluoride and allowed to dry for three or four minutes. These same children received a second, third, and fourth treatment using the same technic at weekly or semiweekly intervals.[1, 2] The children continued to brush their teeth under the supervision of the teacher until the four applications were completed. They were then instructed to continue brushing their teeth at home throughout the year. No follow-up was made except to replenish the diminishing supply of dentifrice. The small amount of dentifrice used indicated that the children lapsed into their original habit of occasional brushing.

Children in Group 2 experienced the same procedure of examination, but the technic of treatment was varied in that the children received a dental prophylaxis by a dentist or a dental hygienist instead of participating in the supervised toothbrushing.

Children in Group 3 were used as a control. Although their teeth were examined, the children received no specific instructions on toothbrushing. However, to cause them to feel that they were receiving the same consideration enjoyed by their classmates and to obtain their full cooperation, children in this group were given a toothbrush with instructions to use it in the daily home care of their teeth.

Table 1 • DMF rate by age for the three groups

Age	Group 1		Group 2		Group 3	
	Number of children	DMF rate for year	Number of children	DMF rate for year	Number of children	DMF rate for year
6	38	0.45	36	0.55	42	0.64
7	44	0.32	41	0.46	43	0.86
8	35	0.43	34	0.12	46	0.56
9	24	0.42	39	0.13	36	0.66
10	32	0.43	24	0.42	47	0.80
11	28	0.29	29	0.55	30	1.04
12	33	0.51	27	0.44	42	0.91
	234	0.36	230	0.38	286	0.71

The original examination and the re-examination one year later were made for the children in all three groups by the same dentist. The same information was charted in each examination for each group. Children who participated in the original examination but were not available for the re-examination were eliminated from the study leaving 234 children in Group 1, 230 in Group 2 and 286 in Group 3 as shown in Table 1.

Teeth that erupted during the one-year period were eliminated in the re-examination because they had not been exposed to the treatment; therefore, this study was made on a child and tooth basis using only the permanent teeth that were present and unattacked in the original examination.

Table 1 shows the number of children and the DMF rate by age for each group that remained in the study throughout the one-year period. The smaller number in the same age groups may have a slight bearing on the DMF rates for certain groups, however, when the rates are combined for an average incremental rate the smaller groups show only a slight deviation from the expected rate. Too, it is quite possible that the 7 and 12 year old children have a higher incremental rate than other age groups due to the high susceptibility of the first and second molars to dental caries.

Table 2 shows the total number of unattacked permanent teeth in each group with the number of teeth that became carious during the year and the attack rate per hundred teeth per year. Group 1 with 2,693 unattacked permanent teeth present had 85 teeth attacked or 3.156 decayed teeth per 100 exposures. Group

Table 2 • Caries attack rate during year for the three groups

	Number of children	Unattacked permanent teeth	Teeth attacked during the year	Percentage of teeth attacked
Group 1 (brushing, NaF treated)	234	2,693	85	3.156
Group 2 (prophylaxis, NaF treated)	230	2,551	84	3.292
Group 3 (control, untreated)	286	3,413	204	5.977

Table 3 • Comparison of DMF rates of the three groups

	DMF rate per child, 1948	DMF rate per child, 1949	Difference	Percentage of improvement
Group 1 (brushing, NaF treated)	2.77	3.13	0.36	49.3
Group 2 (prophylaxis, NaF treated)	2.65	3.03	0.38	46.5
Group 3 (control, untreated)	2.47	3.18	0.71	...

2 with 2,551 unattacked permanent teeth present had 84 new carious teeth or 3.292 decayed teeth per 100 exposures. Group 3 with 3,413 unattacked permanent teeth present had 204 teeth attacked or 5.977 decayed teeth per 100 exposures. Group 1 shows a 47 per cent reduction and Group 2 a 45 per cent reduction as compared to the control. A statistical test of significance shows no significant difference between the results found in Group 1 as compared to Group 2.

On a child basis, as shown in Table 3, Group 1 developed an average of 0.36 carious teeth per child; Group 2, 0.38 per child, and Group 3, 0.71 per child. A 49 per cent reduction is noted for Group 1 and a 46 per cent reduction for Group 2 as compared to Group 3, the control.

SUMMARY

Three groups of children fairly comparable in number, age and economic status, all descendants from European stock, have been studied to determine if supervised toothbrushing can be substituted for the cleansing or quick prophylaxis recommended before the first application of sodium fluoride without decreasing the effectiveness of the treatment. Charts have been used to illustrate more clearly the findings. Every effort has been used to rule out variables that would invalidate this study.

CONCLUSION

It is evident that a 2 per cent solution of sodium fluoride applied topically to the permanent teeth of children that have been unattacked by dental caries using the recommended technic as outlined in this paper will reduce the occurrence of new carious teeth 40 per cent or more.

The same reduction may be obtained by eliminating the quick prophylaxis and substituting two weeks of supervised toothbrushing instruction before topical application of sodium fluoride. These findings should lead to more patient participation in a preventive program, inasmuch as the child would be expected to brush his teeth to be eligible for treatment. This modification of technic should aid materially in increasing the number of children treated, because the time which is generally required to give the cleansing can be utilized for applying the solution. It is possible that further study will demonstrate that two full weeks of toothbrushing will not be required to accomplish the same results. One thorough brushing immediately before the application of sodium fluoride may be all that is necessary to obtain a 40 per cent reduction.

COUNCIL ON DENTAL HEALTH

Conference on community planning for dental health

On October 28, 1950, a one day conference was held by the Council on Dental Health with chairmen of state councils on dental health and state dental health directors. The general purpose of the conference was to provide an opportunity for consideration of some of the more important problems confronting councils on dental health and state health departments in the development of effective community dental health programs. In attendance during the full day session were approximately a hundred participants representing 29 state dental societies, 28 health departments, the U. S. Public Health Service, the Children's Bureau and the American Dental Hygienists' Association.

During the conference, one speaker remarked that it seemed strange that so much talking and so much discussion were necessary before even a small amount of progress could be made. However, during the past decade tremendous strides have been made in the promotion of better dental health in this country, even though year by year the progress may seem slow. Many persons have come to accept the fact that it is a part of the American way of living to talk the same things over and over again until people finally arrive at conclusions which have group acceptance and which will be followed by specific action.

The spontaneous discussion, the excellent reports of activities within the various states, and the keen and spirited interest in the subjects under discussion demonstrated to some degree the worthwhileness of the conference.

Leo J. Schoeny, then chairman of the Council, served as presiding officer. The conference was conducted as an open forum, with two formal presentations to provide the basis for discussion. The morning session was devoted to the community aspects of dental health planning, with W. Philip Phair, assistant secretary of the Council, as the keynote speaker. The afternoon discussion dealt with the national aspects of dental health planning. The subject was introduced by Allen O. Gruebbel, secretary of the Council. The subjects selected were purposely general in nature, the idea being that the first conference with council chairmen and dental directors should provide an opportunity for everyone to present the problems which were particularly important to him and which he wished to have aired. It is hoped that these conferences will become an annual event. If so, future conferences will deal with more specific subjects which represent the desires of the majority of the participants.

At the conclusion of the conference, Kenneth A. Easlick, a Council member,

presented a summary of the day's discussion. Selected comments and suggestions from the summary have been grouped according to a few broad areas which formed a basis of discussion.

THE DENTIST'S ROLE

It was agreed that a dental profession well informed in community health is a must in community planning for dental health. Two of the best ways to become better informed are by participating in the health program and by reading diversified rather than wholly technical literature. In the lengthy discussion of this subject, the thought was presented that the new Section on Dental Public Health for the annual session would give more members a better opportunity to become acquainted with the social implications of their professional services.

EVALUATION OF COMMUNITY NEEDS

More time probably was devoted to the evaluation and interpretation of community needs than to any other one subject during the conference. The factual data which are needed on both the local and national level by both local and national organizations were discussed. The American Dental Association is confronted with a paucity of scientific information regarding the needs, demands and resources for dental health, information which is badly needed, for instance, whenever Association representatives testify regarding health bills in the National Congress. Before a community can plan effectively for a sound dental health program, it must have certain important basic information. Also, better devices are needed for interpreting the information to the community. The discussion pointed out that information should be so evaluated and interpreted that people will want to do something for themselves.

Information is needed on a community level on such subjects as population, dental manpower and its adequacy or inadequacy, patient needs, meaning of a DMF rate, health facilities, percentage of dentists' time devoted to the care of children, availability of speakers, and local agencies that lack dental representation.

SELECTION OF PROJECTS

The participants at the conference pointed out that the type of dental program has to be selected and established essentially on the basis of the people's desires and ability to pay. Professional public relations people and health educators are necessary in helping to promote a dental program. It was agreed that two basic qualities of a community program are acceptance by dentists of social responsibility and recognition by the public that dental health planning must be a joint endeavor of all groups concerned. The group was challenged with the needs of rural areas, for so much discussion and planning seem to center around the urban problem.

DELEGATION OF RESPONSIBILITY

Within each state or locality a definition needs to be made of the responsibilities of the various groups involved in the dental health program. For instance, is it the responsibility of the dental society to supply educational materials for the schools? Is it the responsibility of the schools to excuse children for dental appointments? Even such elementary questions as these must be answered specifically in a smoothly functioning program.

Other areas of responsibility are the appointment of dentists on state and local boards of health, consideration of dental care as a basic health service, leadership conferences, the need for dentists to become familiar with all health agencies in the community and their respective services, and the development of strong organizational patterns and working relationships by dental health councils.

REPORTING AND FINANCING OF PROGRAMS

First of all, there seems to be a need for better reporting to the people within the community regarding their own dental program, so that they may understand and support it. Secondly, reports on dental programs should be made available in published form for persons outside the area, so that they may profit by the experiences of others, both successes and disappointments. The Council on Dental Health of the Association is particularly desirous of learning what state and local councils are doing and what their problems are so that the Council can be of greater service to them.

In regard to financing, Dr. Easlick summarized the discussion by stating that in the initial stages of a dental program, the assistance of local, possibly nongovernmental organizations, will need to be utilized, and then gradually the program can be expanded with proper tax support.

RESOURCES FOR EDUCATION, PREVENTION AND CARE

Admittedly, the subject of resources for dental health education, prevention of dental disease and dental care is far too broad to be covered at a single meeting, but the participants at the conference did present many important phases of the subject.

It was pointed out that the objectives of dental health education need to be defined and differentiated from publicity when the dental program is planned. Better methods of evaluating the results of health education need to be devised. It was suggested that the problem is more complex than the evaluation of results, in that the blocks which actually prevent people from attaining dental health need study and definition so that dental health education materials and technics can be planned on a more scientific basis.

Re-emphasis was given to the wider use of preventive measures. There was considerable discussion of the addition of fluorides to public water supplies.

In order to secure more direct assistance from other agencies, it was suggested that dental societies have representatives attend conferences and meetings of influential groups which plan on the national and local level. Such representation would help insure recognition of the dental health problem and its inclusion in community health planning.

Several of the conferees expressed the need for closer liaison with members of the American Academy of Pediatrics and with physicians in general, so that dentists and physicians would be more nearly in accord in their advice regarding dental health. The need for more dentists on state and local boards of health also was stressed as a means of having dental health become an integral part of the over-all health program.

In several states, reorganizational plans which result in a lowering of the administrative position of dental units in state health departments either have been instituted or are being considered. Such reorganization is being undertaken without consultation with the respective dental societies and is viewed by dental public health authorities as detrimental to the promotion of dental health through a strong and well organized health department. The American Dental Association is presently taking action in this regard.

The need for public health funds which are earmarked for dental health was discussed. Such funds should be made available on all levels of administration, from local to national. Too often funds appropriated for general health work are considerably diluted by the time the dental health program receives its portion.

This section of the discussion was appropriately closed by John W. Knutson, chief, Division of Dental Public Health, U. S. Public Health Service, with the six principles for health planning as set forth by Dorothy B. Nyswander, professor of

public health education, School of Public Health, University of California:

1. You can't plan a program *for* other people. You plan a program *with* people.
2. You get more investment of time and money when the people plan it than you do when you seek to sell the program to them.
3. People are not convinced by what other people tell them. They are convinced by what they find out for themselves.
4. Community planning is slower, but its results last longer.
5. Every health service can be a springboard for sounder education.
6. There is no thinking where there is no problem and there is no problem if you are the only one who finds out what the problem is.

The sale of sweets in schools was discussed at some length, and an official statement from the Association was urged. The Council on Dental Health reported that it had adopted a resolution which reads:

Whereas, the consumption of candy, soft drinks and other confections prepared with concentrated fermentable sugar is associated with an increase in dental caries, and

Wheras, the excessive ingestion of such confections replaces and reduces the use of more complete and nutritive foods, therefore, be it

Resolved, that the sale of candy, soft drinks and other confections in schools be discouraged.

The Council on Foods and Nutrition of the American Medical Association has prepared a useful statement on "Carbonated Beverage Dispensing Machines in School Buildings."[1]

A representative of the American Dental Hygienists' Association presented two needs; namely, brief and inexpensive leaflets for preschool and prenatal education, and guidance from their respective state and local dental societies. The need for in-service training for dental hygienists in methods and technics of health education also was discussed.

PREPAYMENT AND POSTPAYMENT PLANS

A representative of the First District Dental Society of New York gave a concise description of the proposed experimental prepayment plan under consideration in that state. The plan is designed to provide dental services for 25,000 subscribers as an experimental undertaking for two years, during which time the plan can be evaluated and actuarial data can be collected. In addition, brief descriptions were given of postpayment plans, particularly those in Wisconsin and Rhode Island.

CHILDREN'S DENTAL HEALTH DAY

Some of the suggestions with regard to Children's Dental Health Day were: The Association material should be less technical and more adaptable to local use. Local chairmen could provide pictures and information regarding their own areas and thus help to make Association materials more interesting and meaningful in the respective localities. The event should be celebrated for one week instead of for one day; many areas already have adopted this plan. The Association should not proclaim a particular day but should let the local areas or states decide on the one which is most suitable.

The participants were keenly interested in this part of the discussion, and many good ideas were exchanged regarding various activities to promote a better Children's Dental Health Day and better days for children's dental health.

W. Philip Phair
Assistant Secretary

1. Council on Foods and Nutrition of the American Medical Association. Carbonated beverage dispensing machines in school buildings. J.A.M.A. 142:24 (May 6), 1950.

COUNCIL ON DENTAL TRADE AND LABORATORY RELATIONS

Supplemental education from nonprofessional sources disapproved

The following report of the Council on Dental Trade and Laboratory Relations is herewith presented in order to acquaint members with the actions of the House of Delegates with respect to supplemental education of dentists. These actions were taken by the legislative body of the Association as an aid in preserving and improving standards of professional education.

It is not the intention of the Council to interfere with any manufacturer, dealer or dental laboratory in ethically demonstrating the materials, equipment, supplies and service which they render to the dental profession.

The following resolution was presented to the Board of Trustees of the Association July 29, 1948, by the Dental Society of the State of New York:

Whereas, it is the opinion of the Dental Society of the State of New York that dentists should receive all supplemental education from professional sources; and

Whereas, there is a growing tendency for dental manufacturers and dealers to foster and sponsor courses in dental technics; and

Whereas, many commercial publications, distributed free to dentists and others, publish articles on technics and procedures which by law should be performed by dentists alone; and

Whereas, there is an evergrowing tendency for the creation of cartels and trusts by limited certification to certain laboratories to process and employ patented products, materials and equipment; therefore be it

Resolved, that these matters be brought to the attention of the House of Delegates at their annual meeting in Chicago 1948; and be it further

Resolved, that a copy of this resolution be forwarded to the Board of Trustees of the American Dental Association.

This resolution was presented to the House of Delegates and referred to the reference committee on dental education. After considering the resolution the reference committee submitted two recommendations to the House of Delegates which were approved by that body.

1. It is recommended that the House of Delegates adopt the resolution on professional sources of supplemental education.
2. It is further recommended that the Resolution on Professional Sources of Supplemental Education be referred to the Committee on Trade Relations and the Committee on Prosthetic Dental Service for further study and report because they are better qualified to deal with this problem.

The Board of Trustees of the New Jersey State Dental Society in a meeting September 16, 1949, instructed the New Jersey delegation to present a resolution to the House of Delegates of the American Dental Association at its 1949 meeting. The resolution stated in part:

Whereas, we believe that dental education should come within the jurisdiction of the American Dental Association, its constituent and component organizations and recognized institutions of dental education, therefore be it

Resolved, that the House of Delegates of the American Dental Association oppose this development of an unrecognized group in the field of dental education.

The reference committee to which this resolution was referred presented a resolution to the House of Delegates which stated in part:

Resolved, that the House of Delegates of the American Dental Association oppose the development of an unrecognized group in the field of dental education.

This resolution was adopted by the House of Delegates.

These resolutions, along with other reports and complaints, were studied by

the Council on Dental Trade and Laboratory Relations. In 1949 the Council submitted the following resolution to the House of Delegates:[1]

Resolved, that the House of Delegates approve the principle that supplemental education for the dentist should come from professional sources and not from sources outside of the dental profession.

In 1950 the following resolution by the Council on Dental Trade and Laboratory Relations was submitted to the House of Delegates:

Resolved, that the House of Delegates express its disapproval of the issuance of exclusive franchises or licenses to individual dental laboratories.

Both of these resolutions were adopted by the House of Delegates of the Association.

It has been brought to the attention of the Council on Dental Trade and Laboratory Relations that in spite of the action of the House of Delegates various manufacturers, dealers and dental laboratories are conducting courses of instruction for dentists. In some cases a tuition fee is charged, in others the courses are free with the added incentive of free meals for the participants. The main idea of these courses seems to be not the education of the dentist, but the selling of some particular material, equipment, supplies or services. It also has been brought to the attention of the Council that in some cases these courses include operative procedures and are conducted by dentists employed by the sponsors of the courses. In many cases the dentist is not licensed, or registered in the state in which these courses are given and the question arises as to whether they are guilty of the illegal practice of dentistry in that state.

The Council believes that every dentist and constituent society of the American Dental Association should give grave consideration to this problem and use their efforts to stop this practice on the part of the manufacturers, dealers and dental laboratories.

Frederick W. Herbine, Chairman

1. Postgraduate dental education: a responsibility of professional educators (editorial). J.A.D.A. 40:76 (Jan.) 1950.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Nineteen fifty survey of the dental profession. VII. Summary

In response to a growing need for definitive information on various aspects of dental practice, early in April of 1950 questionnaires were sent to more than 20,000 dentists throughout the country. The 3,726 active dentists returning usable questionnaires were distributed geographically in much the same way as are all dentists. There was a slight underrep-

1. This is the last of a series of seven articles. The previous articles appeared in the August, September, October, November, December 1950 and February 1951 issues of The Journal of the American Dental Association in the section entitled "Reports of Councils."

resentation of dentists in the eastern and southern parts of the country and a slight overrepresentation in other sections. The age distribution of respondents also corresponded satisfactorily with existing statistics on the ages of dentists. However, members of the Association were disproportionately represented in the survey, as they comprised 95 per cent of the respondents compared with an estimated 80 per cent of the original mailing list. The greater cooperativeness of Association members is common in surveys of the dental profession.

ASPECTS OF TRAINING AND PRACTICE

Almost three fourths of the respondents practiced in the state in which they earned their dental degrees, despite the fact that only 23 states had dentists who graduated within the state. This apparent incongruity results from the fact that states without dental schools have smaller populations and fewer dentists. In three states, Missouri, Nebraska and Pennsylvania, over 90 per cent of the respondents had graduated from a dental school within the state.

Approximately one fourth of the respondents reported having a degree (nonhonorary) in addition to the dental degree. More than nine out of 10 dentists held the D.D.S. degree, the remainder holding the D.M.D. degree.

Nineteen out of 20 dentists spent the greater part of their time in independent practice, the remainder being salaried. Salaried dentists were on the average about three years younger than the nonsalaried.

About one out of every 13 survey participants classified himself as a specialist. Among all specialists, almost one fourth were diplomates of specialty boards, between one third and three fourths were members of national specialty societies, and one fifth were licensed as specialists by state licensing authority. The great majority, 86.3 per cent, devoted 100 per cent of their time to their specialty, but this varied from 96.9 per cent of oral surgeons to 32.0 per cent of prosthodontists.

The survey participants were asked what formal training preceded their establishment as specialists. The percentages reporting no such formal training ranged from 3.1 per cent of oral surgeons to 25.0 per cent of prosthodontists. Hospital training was reported by 21.3 per cent of all specialists, graduate school and short courses by 66.7 per cent, and preceptorship by 15.9 per cent.

Possession of x-ray equipment was reported by over nine out of 10 dentists. To the question, "Do you use a full-mouth x-ray in making your original diagnosis and treatment planning?", 27.4 per cent answered "always" and 48.4 per cent answered "frequently."

One tenth of the replies were from dentists who indicated that none of their 1948 charges remained uncollected. The median per cent of 1948 charges remaining uncollected in April, 1950, was 2.3 per cent. Presumably this figure represents approximately the amount uncollectible. One fifth of the respondents operated on a cash basis, the remainder using some kind of a postpayment arrangement.

Full-time auxiliary personnel were employed by almost two thirds of the dentists returning questionnaires. Based on survey returns, the total number of full-time employees of United States dentists may be estimated as follows: dentists, 1,900; hygienists, 3,600; technicians, 3,300, and assistants, 55,200.

According to the survey, mean monthly salaries paid to these personnel were as follows: dentists, $513; hygienists, $236; technicians, $264, and assistants, $149.

Over 19 out of 20 dentists reported having a laboratory bill in 1949, the mean being $1,760. From this figure it is estimated that dentists paid $125,400,000 to dental laboratories in 1949.

THE DENTIST'S WORK WEEK

The mean number of hours in the office during the week of April 16 to 22, 1950, was 42.2, of which 33.0 were spent at the chair, 3.8 in the laboratory, 2.2 in other work, and 3.2 in free time. Members of the Association reported only 3.0 hours of free time compared with 7.3 hours reported by nonmembers. General practitioners averaged 5.4 more hours in the office than specialists, although specialists as a group saw more patients during the week.

Dentists over 70 spent almost as much time in the the office during the week as younger dentists, but averaged only 27.0 patients compared with a mean of 52.2 for dentists aged 30 to 49 and 48.7 for all dentists. There were 1.15 patient sittings reported per different patient. The average sitting required 45 minutes of office time or 35 minutes of chairside time.

Dentists employing no dental assistant, hygienist or technician averaged only 37.8 patients during the week, compared with 51.7 for dentists employing one auxiliary and 63.8 for dentists with two auxiliaries.

Dentists in very small and very large municipalities had fewer patients during the week than dentists in cities of between 2,500 and 250,000 population. Members of the Association had a mean of 48.9 patients against 42.4 for nonmembers. Based on the over-all mean of 48.7 patients, an estimated 3,700,000 persons saw the dentist during the week.

THE DENTIST'S WORK YEAR

The mean number of weeks worked in 1949 by all survey participants was 46.5. Excluding those who worked less than 40 weeks the mean was 47.6 weeks. The most common number of weeks worked was 48. About one out of 11 dentists did not take a vacation in 1949 and an equal number took a one week vacation. About one third of the respondents reported vacations of two weeks and another third reported three or four weeks.

The mean number of patients reported for 1949 was 933 and the median was 634. The mean for oral surgeons was 1,695 patients against 276 for orthodontists. In general, dentists in smaller towns reported more patients than large city dentists. Those dentists working 50 to 52 weeks of the year reported fewer patients than dentists working 44 to 49 weeks. Members of the Association had a mean of 937 patients while nonmembers had 853. More than one third of all respondents estimated that 90 per cent or more of their patients during the year returned to receive all recommended dental care.

Based on results of the survey, it is conservatively estimated that 60 million persons, or 40 per cent of the population, saw the dentist in 1949.

AGE AND SEX OF DENTAL PATIENTS

Participating dentists were asked to list each patient treated during the week of April 16 through April 22, 1950, indicating age, sex and type of dental service rendered. A sub-sample consisting of 29,574 patients thus reported was used as a basis for a statistical analysis of dental patients.

Over two thirds of the patients were between 10 and 44, inclusive, although only about half of the general population was in that group. More female than male patients were reported in every age bracket. The over-all ratio was 1.38 females to one male, and it reached a high of 1.82 in the age group 20 to 24. Even when the greater number of females in the general population was taken into consideration there was a disproportionate number of female dental patients at all ages.

DENTAL SERVICES RENDERED

Only 13.6 per cent of the female patients had teeth extracted, compared with 16.9

per cent of the males. However, 47.2 per cent of the females received fillings and inlays against only 44.5 per cent of the males. A slightly greater proportion of male than female patients received upper dentures, but the opposite was true of lower dentures.

Based on the survey findings, it is estimated that approximately the following number of dental services were provided to the people of the United States during the week of April 16 to 22, 1950: examinations, 640,000; roentgenograms, 1,600,000; prophylaxes, 610,000; teeth extracted, 1,040,000; fillings and inlays, 2,870,000; single crowns, 50,000; fixed bridges, 40,000; full dentures, 100,000; partial dentures, 60,000; root canal treatments, 60,000; periodontal treatments, 110,000; orthodontic treatments, 150,000, and fluoride treatments, 50,000. Dentists of course provide many services not covered by this survey.

B. Duane Moen, Director
Leslie M. FitzGerald, Chairman
Advisory Committee

COUNCIL ON DENTAL EDUCATION

Additional dental internship and residency programs approved

The Council on Dental Education and its Committee on Dental Internships and Residencies have reviewed the applications from a number of hospitals for approval of their educational programs. These hospitals have had their dental departments approved by the Council on Hospital Dental Service and the inspectors of that Council have inspected the educational program and facilities of these hospitals. These inspectors have reported on the manner in which these programs agree with the Requirements for the Approval of Hospital Dental Internship and Residency Programs developed by the Council on Dental Education and approved by the House of Delegates of the American Dental Association. Also, the Council on Hospital Dental Service has recommended to the Council on Dental Education that the internship and residency programs under consideration be approved.

The Council on Dental Education and its Committee on Dental Internships and Residencies voted at the meeting held in Chicago on January 31, 1951, to approve the educational programs in the hospitals listed in the accompanying table. The area or areas for which approval has been given, as well as the type of program, are also indicated.

The initial list of hospital dental internships and residencies approved by the Council on Dental Education appeared in the January 1949 issue of The Journal of the American Dental Association. Additional lists appeared in the April 1950 and January 1951 issues.

Table • Hospitals and programs which have been approved

Hospital	Type of program	
	Internship	Residency
Letterman General Hospital San Francisco, California Marhl H. Welch, Col., DC, Dental Administrator		Straight Oral surgery
St. Mary's Hospital 56 Franklin Street Waterbury, Connecticut Bernard A. O'Hara, D.D.S., Dental Administrator	Mixed Anesthesia Dentistry for children Endodontics Operative dentistry Oral pathology Oral surgery Orthodontics Periodontics Prosthodontics Roentgenology	
St. Elizabeth's Hospital Nichols Avenue Washington 20, D.C. E. B. Frank, D.D.S., Dental Administrator	Mixed Anesthesia Oral surgery Roentgenology Prosthodontics Periodontics Operative dentistry Oral pathology	
Walter Reed General Hospital Butternut Street and Georgia Avenue Washington 12, D. C. William F. Scheumann, Col., DC, Dental Administrator		Straight Oral surgery
Children's Memorial Hospital 707 Fullerton Avenue Chicago, Illinois Gordon H. Rovelstad, D.D.S., M.S.D., Dental Administrator		Straight Pedodontics
Newark City Hospital 116 Fairmount Avenue Newark 7, New Jersey J. E. H. Guthrie, D.D.S., and J. Crecca, D.D.S.	Straight Oral surgery	
Meadowbrook Hospital Box 108 Hempstead, New York W. F. Harrigan, M.D., D.D.S., Dental Administrator	Straight Oral surgery	
St. Luke's Hospital 431 West 113th Street New York 25, New York H. W. Carr, D.D.S., Dental Administrator	Straight Oral surgery	
Cleveland City Hospital Cleveland, Ohio P. J. Aufderheide, D.D.S., Dental Administrator	Straight Oral surgery	
Knoxville General Hospital Knoxville 17, Tennessee Harry Underwood, D.D.S., Dental Administrator	Straight Oral surgery (to include periodontial	Straight Oral surgery (to include periodontial

COUNCIL ON DENTAL RESEARCH
COUNCIL ON DENTAL THERAPEUTICS

Status report on the reactions of the pulp to self-curing resinous filling materials

Current interest in the auto-polymerizing resinous filling materials has emphasized the need for further information on the effect of these resins on the pulp. Also there have been reports of lack of uniformity in the conclusions derived from histologic studies with these materials. Because of this situation, the Council on Dental Research and the Council on Dental Therapeutics requested Thomas J. Hill, Paul C. Kitchin, George C. Paffenbarger, Isaac Schour and E. W. Skinner to serve as consultants to review the problem and to prepare a report for the consideration of the two Councils.

The consultants surveyed the available literature and the statements of several additional histologists and then met with a group of investigators to discuss their procedures and to examine the histologic evidence submitted by these investigators. Their complete cooperation was an essential factor in the success of this project. The following statements were prepared after the examination by the consultants of the histologic specimens furnished by the several research groups.

PHYSICAL PROPERTIES THAT MAY RELATE TO EFFECT ON THE PULP

Heat Produced During Polymerization (Hardening) • The rise in temperature of a filling made of the most rapidly polymerizing resin reaches a point only a few degrees above normal mouth temperature. It may therefore be concluded that the heat of polymerization of an acrylic filling is not enough to be of any serious consequence to the welfare of the pulp. However, if a large volume of acrylic resin should be used, as in the case of a temporary jacket crown, the temperature may rise high enough in the pulp chamber to cause serious pulp damage.

Dimensional Change • The most serious disadvantages of the direct resinous filling materials are shrinkage during polymerization and a high coefficient of thermal expansion as compared to that of the tooth. These defects are not only of concern from the standpoint of the retention of the filling but also may cause leakage followed by irritation of the pulp. The high thermal expansion of the resin cannot be controlled by the dentist, but the shrinkage can be directed by the proper technic of manipulation into portions of the cavity where it will be least objectionable. To do this, the matrix strip must be held immobile until a test piece approximately the same size as the restoration becomes hard when held in the closed hand. After removal of the matrix, the restoration should not be disturbed for 15 to 30 minutes, depending upon the rate of hardening of the particular resin used. Finishing and polishing should be delayed until a subsequent appointment in order to avoid distortion of the restoration in its early stages of hardening.

Retention • The resins, when hard, do not adhere to the tooth. Therefore undercutting is imperative. Undercutting the point angles only is insufficient. The un-

dercut should be continuous and preferably rounded.

Inhibition of Polymerization • The use of phenols such as thymol, eugenol and phenol interferes with the polymerization of the acrylic and therefore the use of phenolic substances is contraindicated in this connection.

EFFECT OF THE CURRENT SELF-CURING RESINS ON THE PULP

Although there were variations in pulp response, under no conditions were these disturbances considered to be of a type to result in permanent injury.

Since these filling materials are indicated primarily for areas free from masticatory stress, and since they have no significant thermal or chemical effect on the pulp, the use of phosphate cement bases does not appear to be indicated. If cement bases were used, their only function would be that of creating a rigid foundation. The available evidence indicates that they probably are more irritating than the acrylic materials themselves.

Evidence to date is based chiefly upon animal experiments. There is need for further experimental investigation and observation on animal and human teeth.

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LON W. MORREY, D.D.S., EDITOR
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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

Further research needed to determine the value of self-curing resinous materials

Probably the most important development in dental science in Germany during World War II was the auto-polymerizing resinous filling material. Not since silicate cement was introduced 50 years ago has any material made such an impact on operative dentistry. As is usual with the introduction of a new material, controversy reigns about its merits, faults and comparative value with other materials already in use. Dentists want to know whether the self-curing resinous filling materials are safe to use and especially whether they are better than silicate cement. As yet researchers have no positive answers to these questions. They can only examine the present evidence for possible answers. Such evidence is obtained from the research laboratory and from clinical trial by hundreds of dentists. So far most of the investigations have been conducted on the teeth of laboratory animals.

On February 22 a group of investigators, meeting in the Central Office of the Association, formulated a statement relative to the effect of resinous filling materials on the dental pulp. This statement, published on page 449 of this issue of THE JOURNAL under the co-sponsorship of the Council on Dental Therapeutics and the Council on Dental Research, practically absolves the resins of irreparable harm to the pulp. It appears from laboratory research that they are less irritating than silicate and phosphate cements when placed in undecayed teeth of animals. Clinical evidence tends to substantiate the laboratory findings although clinical evidence, unsupported by histologic evidence, must be considered inconclusive since histologic examination provides a more sensitive test of pulp reaction. Clinical evidence indicates that the most serious disadvantage of the resinous filling materials when improperly handled is shrinkage during polymerization which may cause leakage, with its sequelae of recurrent decay and irritation.

The proper management of the direct resinous filling material, like the proper management of any filling material, stems from a knowledge of its physical and

chemical properties. Many of the early failures with resinous filling materials can be attributed to the premature release or removal of the matrix and premature finishing. The tendency of many dentists has been to use the resins like the silicate cements. However, the great difference in the physical and chemical properties of the two materials excludes such a practice. A resinous filling takes from two to four times as long to place as a silicate cement restoration. Unless the dentist is willing to give this extra time he should not use the self-curing resinous material.

The research work on dental materials, sponsored jointly by the National Bureau of Standards, the Federal Dental Services and the Association, includes a thorough investigation of the direct resinous filling materials. The first of a series of reports on the physical and chemical properties of the direct resinous materials was published in the March 1951 issue of THE JOURNAL. This report deals with the rise in temperature occurring during the polymerization of the material. As soon as other current studies are completed they will be reported in THE JOURNAL. From these data Association specifications can be formulated and a List of Certified Direct Resinous Filling Materials can be established.

Studies to date indicate that the auto-polymerizing resinous filling materials shrink on setting three to four times as much as silicate cements, that they stain less than silicate cements and that they are practically insoluble in mouth fluids. However, even though cement dissolves more rapidly than resin, recurrent decay around a silicate cement filling is seldom seen.

On the basis of present knowledge the dentist is justified in using both silicate cement and the resinous materials side by side so that their properties can be compared over a period of time. At the moment there seems to be sufficient evidence to tip the scales slightly in favor of the resins. Further research on, and improvements in, the present self-curing resinous materials and further investigations of their effect on the pulps of human teeth are needed before an authoritative prediction of their ultimate status in operative dentistry can be made.

Improved regulations increase value of National Board dental certificate

The Council of the National Board of Dental Examiners recently adopted two new regulations which will make the National Board dental certificate even more valuable than formerly. Prior to the adoption of the new rulings a candidate who passed the National Board examinations did not receive his certificate until he had been in practice for three years and had submitted evidence of acceptable ethical and professional standards. Because of the three year ruling many students saw little value in taking an examination since the records and certificate could not be used until some future date. Under the new regulations a certificate is granted immediately to the candidate who has passed all of the National Board examinations in the basic sciences and theoretic aspects of dentistry, and his record may be sent at once to any of the state dental examining boards that recognize the certificate. After three years the successful candidate returns the certificate to the Council for registration.

This practical change in procedure makes the records of successful candidates available at a time when the majority of dentists need them most; that is, when they are taking their state board dental examinations. Since the certificates are registered by the Council at the end of three years they carry the same prestige as certificates which previously were issued to the dentist only after he had been in practice for a similar period. Certificates that are not returned for registration will be cancelled and their owners will not be able to use them or their National Board records in any subsequent application for licensure.

Also, under the new ruling, holders of a National Board certificate are not restricted with respect to its use. The certificate will be sent to as many of the state dental examining boards as the dentist wishes.

Now that these new regulations have been put into effect it is anticipated that more dental students will take advantage of the National Board examinations. It also is anticipated that the change in policy will be received favorably by the state board dental examiners and the dental schools.

The value of national testing programs such as those provided by the Council of the National Board of Dental Examiners is apparent. The construction of the paper-pencil examinations normally used for the evaluation of the student's competence in the basic sciences is difficult and tedious. The National Board of Dental Examiners, by assuming the responsibility of constructing reliable examinations periodically in the fields of basic science and theory, renders a valuable service to state dental examining boards as the members of such boards may substitute the National Board examinations for those which they ordinarily would prepare and score. This enables the members of the state examining boards to devote more time to the development of tests and methods of evaluating the clinical and diagnostic ability of the candidate.

Acceptance of the program developed by the Council of the National Board of Dental Examiners increases each year. Twenty-four states, the Army and the United States Public Health Service recognize the National Board certificate and it is reported that several other states will announce their acceptance soon. Since the Council examines candidates only in the basic sciences and theory, leaving the clinical and practical examinations to the state board examiners, it would seem that the universal recognition of the National Board certificate would be expedient.

The dentist's responsibility in the campaign against cancer

In the war against cancer the dentist occupies a very strategic position. He is stationed in an advanced observation post, as it were, to detect the onslaught of a menacing enemy. Today the world is engaged in a mass assault on this common foe, and intensive studies are being made in cancer research laboratories seeking a defensive weapon against it. But in spite of all the efforts of science so far, no practical means of preventing this dread malady has been found.

Until such a time as the cause and more adequate means of controlling cancer is determined, there is but one weapon by which it can be combatted: early detection

and surgical removal. Early recognition and prompt action are most important, for the time factor largely determines the success of the operation. In cases of mouth tumors this places a heavy responsibility on the dentist.

Since so large a percentage of neoplasms occur in the oral region, the lips, the cheeks, the oral cavity and the pharynx, they often come under the observation of the dentist. Many of these growths exist for some time without the patient being aware of them. Until he does recognize that something is wrong, he will not seek medical advice and the neoplasm continues to grow. In the course of dental examination and treatment the dentist has the opportunity to discover the growth, to call it to the attention of the patient and advise immediate surgical intervention. This is the great service dentistry can render to the public in the war against cancer.

That dentistry is rendering a greater service today than formerly in the campaign against cancer is indicated in a report by Leonard B. Goldman published elsewhere in this issue of THE JOURNAL. Dr. Goldman reports that "The mortality rate of mouth cancer during the last 10 years has declined appreciably. In 1936 there were 4,081 deaths from mouth cancer, a mortality rate of 3.19 per 100,000; in 1947 there were 3,735 deaths, a mortality rate of 2.6 per 100,000. This lowered mortality rate has been caused in part, by an increasing cancer awareness on the part of the dentist."

Every dental examination and every dental operation should include a thorough survey of the oral mucosa, the tongue and the pharynx. Elevations on the lips or cheeks also should be given careful scrutiny. Every unusual elevation or thickening of the epithelium should be viewed with suspicion. In the early detection of these new growths the dentist may save the life of his patient and render him a service that no one else is able to perform. In this, dentistry shares with medicine a great obligation to society.

For lack of what is known variously as "dramatic impact," "scare-force" or "glamour," dentistry and dental diseases are taking a back seat in the Washington competition for Federal financial support. The annual demonstration of this point came around again in March, at House Appropriations Committee hearings on sums to be allocated in 1951-52 for aid to research in the health sciences.

Again, as in past years, persons well known in public life—laymen as well as professional people—went before the Committee to urge increased funds for research in cancer, heart disease, mental conditions, arthritis, and so forth. But no one came to testify in behalf of dental research. Some time in April, similar hearings will be conducted by the Senate Appropriations Committee and a repetition of this situation may be anticipated.

Despite the oft heard complaint about a "toothache that's killing me," oral pain and pathology are missing from tables of fatality and disability rates; therefore it is difficult to get Congress exercised over dental problems when Federal grant appropriations are under consideration. Unquestionably this apathy is responsible for the fact that efforts to secure a separate building for the National Dental Research Institute have been futile and funds provided to date for assistance to nongovernmental dental research have been disproportionately low, in comparison with heart, cancer and general medical projects.

Certain Washington officials with whom these matters were discussed expressed conviction that the time has arrived for an aggressive campaign that will impress public consciousness with the importance of dental research. Such a campaign would emphasize, for example, that the dentist frequently has the first opportunity to diagnose certain types of cancer; that dental disease, when not checked in time, may be the precursor of more generalized physical problems; that encouragement of dental research holds promise of hastening solutions of numerous health problems which today are responsible for enormous loss of productivity, at a time when manpower requirements are critical.

U. S. Public Health Service, meantime, has awarded $49,571 to dental schools and $434,711 to medical schools in its continuing program to improve cancer instruction in the curricula. Eleven dental schools are among the latest recipients, each receiving approximately $5,000. Howard University College of Dentistry receives its first cancer teaching grant since this program was begun in 1947. All but three of the nation's dental schools are now participating in this form of Federal assistance.

Besides Howard, the new grantees are: University of Southern California School of Dentistry, Loyola University School of Dentistry, University of Illinois College of Dentistry, Washington University (St. Louis), University of Oregon Dental School, Meharry School of Dentistry, University of Texas School of Dentistry, University of Washington School of Dentistry, Marquette University School of Dentistry, and Georgetown University Dental School.

LEGISLATION PENDING

On Capitol Hill, the question of medical, dental and nursing resources and what should be done to assure an adequate supply to meet military, civil defense and normal civilian requirements continues to be argued with intensity. Specifically, the pending universal serv-

ice and education-aid bills comprise the legislation in which professional manpower is a vital factor.

There is every indication that Congress, in whatever form of law it finally enacts amending the draft statutes and introducing compulsory military training, will make provision for deferment of prospective dental students. Quite possibly the administration of this phase, including decisions as to the number of deferees, will be left up to the President.

Less predictable is the outcome of the controversy over Federal financial aid to medical, dental and nursing schools. On March 12, an effort was made on the Senate floor to pass this bill (S 337) by unanimous consent but objections by Sen. Everett M. Dirksen (R., Ill.), blocked the move. Ultimate passage by the Senate, however, is virtually a certainty. The question-marks are all on the House side: whether the bill will be approved by the Interstate and Foreign Commerce Committee and, if so, whether the Rules Committee will permit it to be brought up on the floor for final action.

Strongly recommending passage of S 337 on March 12, Sen. Lester C. Hunt (D., Wyo.) said in part:

> I am very much in hope that the Senate will pass this bill and will pass it unanimously, as it passed a similar bill in the last Congress, and that this time the bill will not bog down in the House of Representatives.
>
> The cost of educating students has become so great to the medical and dental schools that some of the non-tax supported schools are actually going to have to fold up if we do not do something to help them. So I hope when this bill again comes before us for consideration, the Senate will look with favor upon it.

CIVIL AND MILITARY DENTAL STRENGTHS

New light upon present and estimated future output of dentists in the United States was scheduled to be cast late in March at the French Lick (Ind.) meeting of American Association of Dental Schools. Data have been compiled by the Medical Advisory Committee to National Security Resources Board, whose dental member, Leo J. Schoeny, of New Orleans, was to make the presentation. Paul Barton, executive secretary of the committee, planned to accompany Dr. Schoeny to French Lick.

Taking a glance at the military, all three armed services appear to be satisfied with the rate of growth of their respective dental departments. Under pressure of the doctor draft law, voluntary commissionings in March in the Army, Navy and Air Force dental corps were sufficient in number to fulfill expanding needs.

Considerable interest now is focused on Federal Civil Defense Administration and what turn its health and welfare division will take in connection with utilization of civilian dentists and physicians. In over-all charge is William L. Wilson, whom Army lent to FCDA to guide this part of the defense program. Appointment of the professional staff that will serve under him, and which presumably will include dental representation, has not yet been completed.

Armed Forces

NEW DRAFT BILL NEARS ENACTMENT: ARMY TO ORDER 100 DENTAL RESERVE OFFICERS TO ACTIVE DUTY IN APRIL

The setting up of a permanent Selective Service system to replace the present program which expires July 9 came two steps nearer in March when the Senate passed its version, and the House Armed Services Committee approved a House version, of a bill providing for a program of universal military service and training.

Consideration by the House is expected in early April and, if the House version is passed, differences in the two bills will be ironed out in conference committee.

In the Senate version, authorization is provided for six months' military training for all men at age 18, in a program to be instituted by the President or concurrently by Congress when the need for military service is not immediate, and to be administered by a civilian board. Although the House Committee met behind closed doors and by mid-March its report was not yet available, it is reported that the House also included provisions for setting up universal military training later.

The Senate bill lowered the draft age to 18 but provided that the 18-year-olds would not be drafted until all those 19 to 26 years old had been called. The House Committee's bill lowered the draft age to 18½, it is reported.

The Senate bill extended the length of military service required to 24 months; the House Committee's bill extended it to 26 months but turned down the proposal to extend the period of service for organized reserves and national guard beyond 21 months.

The Senate bill left provisions for the drafting of physicians and dentists intact, including the annual deferment of predental students in numbers sufficient to maintain dental school enrollments at present levels. Provisions for "temporary withdrawal" each year of 75,000 inductees, selected by a civilian board for special education, were left in the Senate bill. Details of the House Committee bill in these respects had not been made public at the time of going to press.

APRIL ARMY RESERVE CALL-UP

The Army has announced that this month it will order 100 Reserve dental officers into active duty from Priority I.

This is the first group of dental officers ordered to active service by the Army since the December call-up of 850 dental officers, the Army stated.

Quotas for the Army areas are as follows:

Army District	Dental Officers
First	0
Second	13
Third	10
Fourth	20
Fifth	17
Sixth	40

Reserve officers with four or more dependents will not be ordered to active duty if they can prove hardship when they request exemption, according to an Army announcement. Dependents are defined as "lawful wife, legitimate children and dependent parents."

In another report it is stated that the

Army has decided to discontinue commissioning of senior dental students.

NAVY RESERVE STILL CLOSED TO PRIORITY I DENTISTS

The Navy Dental Corps Reserve remains closed to dentists in Priority I but is open to dentists in Priorities II, III and IV except ASTP trainees, the Defense Department states. The Regular Navy Dental Corps is closed to all priorities.

AIR FORCE AGAIN ACCEPTING PRIORITY I VOLUNTEERS

The Air Force will again commission a limited number of volunteer applicants from Priority I dentists, it was announced February 12. Commissioning from Priority I was discontinued last November when the Air Force announced its dental needs were filled. The additional dentists are needed to care for the "unprecedented number of direct volunteer enlistments in the Air Force," it was stated.

Air Force also is accepting applications for Reserve commissions from dentists in Priorities II, III and IV.

DENTAL MEMBERS NAMED TO STATE ADVISORY COMMITTEES

New dental appointees to three State Advisory Committees to Selective Service have been announced.

With the recent appointment of E. C. Hume and Frank W. Jordan, both of Louisville, to the Kentucky State Advisory Committee to Selective Service, the Committee now has three dental members. The third member, J. L. Walker of Louisville, was appointed at the time of the Committee's inception.

Harry A. Reiman of Wooster has been appointed a second member of the Ohio State Advisory Committee. The other dental member is J. C. Longfellow of Bellefontaine.

Cecil F. Lindley of Seattle has been appointed dental member of the Washington State Advisory Committee, to replace Jack C. Garretson who resigned.

TRANSFERS TO OTHER SERVICES SHOULD BE REQUESTED SOON

The Department of Defense has issued a reminder to Regular and Reserve medical and dental officers that if they are going to apply for transfer to another military service, they should do so without delay. Authority for such transfer, provided by Public Law 779, expires July 9.

Personnel transferred will be credited with Federal service already performed, for purposes of promotion, seniority and retirement, and unused leave may be transferred without loss, the Defense Department stated.

ARMED FORCES DENTAL REPORT FORMS TO BE STANDARDIZED

James P. Hollers of San Antonio, Tex., dental member of the Armed Forces Medical Policy Council, is directing a study to standardize dental report forms in order to assure uniformity among the services, it is reported.

The Defense Department late last year issued specifications for conducting dental examinations, and for dental classifications of individuals, by the Army, Navy and Air Force, in order to assure uniformity in these respects. (See January issue of THE JOURNAL, p. 80.)

NAVY DENTIST WINS AWARD AS COMPOSER OF SONG

Cmdr. Clay A. Boland, Dental Corps, USN, has been awarded an Honor Medal from the Freedoms Foundation for a

prize-winning song he composed, "I Like It Here."

Commander Boland, who is director of the Naval Reserve dental program of the Bureau of Medicine and Surgery, Washington, D. C., has composed several popular hit tunes, and for the past 16 years has written the musical scores for the Mask and Wig Club of the University of Pennsylvania. For the past three years he has been president of the Mask and Wig Club.

The Freedoms Foundation, with headquarters at Valley Forge, Pa., was chartered in March 1949 as a nonpolitical, nonsectarian, nonprofit organization devoted to patriotic efforts in behalf of the heritage of American freedom, according to a Navy spokesman who announced the award.

Veterans Administration

MILITARIZATION OF DENTAL PERSONNEL IN VA PROPOSED

A bill that proposed blanketing into the Armed Services all physicians, dentists, nurses and technicians of Veterans Administration Department of Medicine and Surgery, was introduced in the House by Rep. Edith Nourse Rogers (R., Mass.) in early March. The bill was intended to freeze such personnel in their present jobs, and prevent them from leaving VA for military and better paying civilian jobs, it was reported. A similar plan was in effect late in World War II.

DENTISTRY MOST POPULAR SUBJECT IN VA LIBRARIES

Dentistry ranks "most popular" of 46 subjects represented in 314 publications since the end of the war which are available in Veterans Administration Hospital libraries, according to a VA announcement in March. Sharing the "most popular" ranking are neurology and psychiatry.

A bibliography listing the 314 articles on the medical care of veterans was prepared by the VA library service for the assistance of VA hospital and medical personnel in the preparation of various types of studies. Most of the publications listed are available in VA hospital libraries and the remainder may be obtained on an inter-library loan basis, the announcement states.

ADMIRAL BOONE SWORN IN AS MEDICAL DIRECTOR OF VA

Vice Admiral Joel T. Boone took the oath of office as chief medical director of Veterans Administration February 28, to succeed Paul B. Magnuson who resigned in January.

Association Affairs

FLUORIDE DENTIFRICES RATED "UNACCEPTABLE"

The Council on Dental Therapeutics at its February meeting rated dentifrices containing inorganic fluorides as unacceptable, and reaffirmed its decision not to attempt evaluation for acceptance of toothbrushes at the present time, according to J. Roy Doty, secretary of the Council.

Dentifrices containing inorganic fluorides were reclassified from Group C (require further study) to Group D (unacceptable). Ammoniated dentifrices and dentifrices containing chlorophyll remain in Group C.

The Council agreed that lack of con-

trolled evidence regarding the beneficial effects of gingival massage — often claimed to be a second purpose of toothbrushing in addition to cleansing—precludes evaluation of toothbrushes for acceptance at this time.

Guests at the meeting included Don W. Gullett, secretary of the Canadian Dental Association; Walter Wolman, Frederick Jung and Robert Stormont, all of the American Medical Association; and E. E. Nelson, medical director of the Food and Drug Administration.

A full report by the Council will appear in an early issue of THE JOURNAL.

$85,083 CONTRIBUTED TO RELIEF FUND BY MID-MARCH

Relief Fund tabulations in mid-March showed a record total of $85,083.03 received toward the national goal of $100,000 in the 1950-51 campaign.

Alabama, well in the lead with contributions totaling 205 per cent of its quota, was followed by Southern California with a total of 177 per cent. Other societies which had exceeded their quotas were: Alaska, Arkansas, Colorado, District of Columbia, Georgia, Hawaii, Montana, Nebraska, Nevada, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, Panama Canal Zone, Tennessee and Washington.

Relief fund officials urged dentists to a special effort during the last three months of the drive in order to reach the national quota.

DISTRIBUTE MANUAL ON DENTAL UNITS IN HEALTH DEPARTMENTS

A manual entitled "Dental Administration in State Health Departments" prepared by the Council on Dental Health of the Association has been mailed to state dental societies, dental directors of state health departments, and district consultants of U.S. Public Health Service, according to W. Philip Phair, assistant secretary of the Council.

The manual was prepared after a study of the administrative status of state dental units, made in accordance with the resolution of the House of Delegates last year which recommended that "dentistry be made a basic health service in all official state and community health programs," and that dental societies be given assistance in their efforts to correct and prevent inexpedient administrative patterns for dental units in state health departments.

The 50-page manual was prepared in consultation with the Council on Legislation of the Association.

DUNN REPLACES SORRELS ON INSURANCE COUNCIL

The ad interim appointment of R. M. Dunn of Tulsa, Okla., to the Council on Insurance, has been announced by Harold W. Oppice, president of the Association. Dr. Dunn replaces Harry Sorrels of Oklahoma City, who resigned.

Dental Societies

N.Y. STATE SOCIETY HOLDS PREPAYMENT PLAN WORKSHOP

A three-day workshop on dental prepayment plans was held by the Dental Society of the State of New York in Syracuse in mid-March, in what is believed to be the first large scale attempt made by a state dental society to determine the requirements of a dental health service plan.

Sponsored by the Council on Dental Health of the State Society, the program included a presentation by W. Philip Phair, assistant secretary of the Council on Dental Health of the Association. Dr. Phair described the general policy and actions of the Association with regard to such plans and made suggestions as to how they can be applied.

The Association has recommended since 1944 that experimental prepayment plans for dental service be inaugurated under the sponsorship of dental societies.

N.Y. STATE SOCIETY CREATES FORUM OF DISTRICT OFFICERS

A District Officers Conference has been created by the Dental Society of the State of New York, to constitute a forum for discussion of matters of mutual interest. The Conference, comprised of officers of the ten Districts, in December elected Harry L. Bisnoff of Jamaica as chairman; Max Goldstein of New Rochelle as vice-chairman, and Peter L. Battista of Buffalo as secretary. Charles A. Wilkie, secretary of the State Society, is adviser.

According to Dr. Bisnoff, who announced the Conference, it is believed that the forum will serve to make known to the State Society the needs and wishes of the component Districts, and that out of it will come "constructive material . . . which will enhance the service of organized dentistry to the profession and to the public."

PROMPT RESPONSE IN FEE SURVEY IS URGED

State societies conducting dental fee surveys are urging dentists to complete and return their questionnaires without delay, since a good response is necessary in order to obtain reliable figures, according to B. Duane Moen, director of the Bureau on Economic Research and Statistics of the Association.

Twenty-nine states have signified their intention of conducting surveys in order to meet the need for such information in connection with governmental, voluntary and philanthropic dental programs, Mr. Moen reports.

H. TRENDLEY DEAN TO RECEIVE JARVIE FELLOWSHIP MEDAL

H. Trendley Dean is to be awarded the 1951 Jarvie Fellowship Medal at the 83rd annual meeting of the Dental Society of the State of New York May 8 in Buffalo. The gold medal award is made annually by the Society to an individual whose contribution has materially advanced the science and art of dentistry.

Dr. Dean, who has been director of the National Institute of Dental Research since its creation by Congress in 1948, has been active in the U.S. Public Health Service since 1921. For many years he has specialized in the epidemiological study of dental diseases and he is credited with the major part in research leading to the use of fluoride in caries prevention.

He is a past president of the Association of Military Dental Surgeons and of the International Association for Dental Research, and a member of the American Dental Association.

At the Greater Philadelphia Annual Meeting of the Philadelphia County Dental Society January 31-February 1, which was attended by nearly 6,000 dentists, Robert H. Nones, Jr., a Philadelphia dentist, acted as official photographer and took this photograph of four distinguished members of the profession. Left to right they are LeRoy M. Ennis of Philadelphia, president-elect of the Association; W. Earle Craig of Pittsburgh, trustee from the Third District; Paul E. Bomberger of Lancaster, Pa., president of the Pennsylvania State Dental Society; and Clyde E. Minges of Rocky Mount, N. C., president of the Association in 1948-49.

Dental Education

NEW BROOKLYN MEDICAL CENTER WILL INCLUDE DENTAL SCHOOL

Plans for a dental education program at the State University of New York envisage a dental school with an enrollment of 400 students, at a $40,000,000 medical center to be constructed in Brooklyn, according to Alvin C. Eurich, State University president.

The Brooklyn medical center will expand the facilities of the Long Island College of Medicine which, with the Syracuse University School of Medicine, was taken over by the State University two years ago with the intention of making both of them into centers of education in the health professions.

Date of establishment of the dental school was not predicted. "The program in dental education must await construction of new facilities in each center, since neither center now has the physical plant capable of initiating such a program," Dr. Eurich stated.

Maynard K. Hine of Indianapolis, dean of the Indiana University School of Dentistry, is consultant to Dr. Eurich, and to Carlyle Jacobsen, executive dean for medical education, regarding the projected dental program.

NORTHWESTERN OFFERS WEEK OF SCIENTIFIC SESSIONS IN JUNE

Northwestern University Dental School announces a five-day scientific session June 4-8. The program, entitled "A Century of Progress in Dentistry," will be presented in connection with the University's centennial celebration. Outstanding authorities from all parts of the country and Canada, including the deans of several dental schools, will offer intensive courses on the scientific and technological aspects of eight dental subjects.

Course titles include: "The Child in Your Practice," "New Developments in the Field of Operative Dentistry," "Significant Factors in the Maintenance of Health of the Investing Tissues of Teeth," "A Refresher Course in Complete Denture Prosthesis," "Restorations with Fixed and Removable Partial Dentures," "Problems in Oral Surgery," "Orthodontia Seminar," "Refresher Course for Dental Hygienists."

Included in the program will be a review of Northwestern's significant contribution to dental progress, and discussions of tooth eruption in its relation to the development and growth of the supporting structures, radioactive isotopes and pharmacology, dental roentgenology, diet and nutrition, cancer and the dentist, and problems of an aging population.

Admission to the Monday and Tuesday, June 4-5, programs will be by registration only and attendance will be limited. The Wednesday and Thursday, June 6-7, programs are open to all members of the American Dental Association.

Additional information may be obtained from Arne F. Romnes, chairman of the program committee, Northwestern University Dental School, 311 East Chicago Avenue, Chicago 11.

MINNESOTA HONORS FORMER DEAN AND AWARDS MEDALS

At a centennial dinner in honor of the late Alfred Owre, held by the University of Minnesota School of Dentistry February 17, the Medical Sciences Building was renamed "Owre Hall" in honor of the former dean, and 12 graduates of the school received Outstanding Achievement Award Medals with citations.

A plaque renaming the building was presented to the university by the Minnesota State Dental Association.

Recipients of the award medals were: Peter J. Brekhus of Minneapolis, faculty member of the School from 1910 to 1943;

A course in operative dentistry given by Ralph C. Cooley ten years ago resulted in the formation of a study club named after him by the Chicago dentists who attended it. The group meets regularly for clinics, attends clinics throughout the country, and has also presented clinics at meetings of dental societies.

In the illustration are Dr. Cooley (left) and C. A. Cameron, president of the group, with the cup which Dr. Cooley presented to the Club at its annual banquet in Chicago February 6, in recognition of its "unselfish contribution to organized dentistry." Inscribed on the cup are the names of the 16 present members, all of whom were in the founding group.

W. J. Nock, a past president of the Club, in announcing Dr. Cooley's award, said that the members recommended the formation of similar organizations to "reap the abundant harvest that comes with concentrated work, and the changing of energy into creative ability."

Dr. Cooley is a past president of the Academy of Restorative Dentistry, an honorary member of the American Dental Society of Europe, and until recently taught operative dentistry at the Dental Branch of the University of Texas in Houston.

George M. Damon, assistant dean and clinical professor of denture prosthesis; Max E. Ernst of St. Paul, clinical professor of orthodontia; Henry S. Godfrey of Minneapolis, member of the dental school faculty 1897 to 1928; Robert O. Green of St. Paul, professor of bacteriology and immunology, and chairman of the division of operative dentistry from 1938 to 1948; Thomas B. Hartzell of Minneapolis, president of the American Dental Association 1921-22; Lorin B. Hodgson of Breckenridge, Minn.; Roland G. Keyworth of St. Paul; John W. Knutson, chief of the Division of Dental Public Health, U.S. Public Health Service; Charles Nelson of Fergus Falls, Minn.; Lewis R. Stowe of New York, professor of dentistry at Columbia University; and James M. Walls of St. Paul, long-time chairman of the division of operative dentistry of the dental school.

MICHIGAN TO HOLD WORKSHOP ON PERIODONTAL DISEASE

A Periodontal Disease Workshop will be held in Ann Arbor, Mich., September 10-15, planned jointly by the faculties of the School of Public Health and the School of Dentistry of the University of Michigan.

The conference, the third of the University's workship conferences, will utilize the technic of consultant and group participation, in an attempt at critical appraisal of current information in five areas: (1) behavior of gingival and supporting tissues; (2) local factors in periodontal disease; (3) systemic factors in periodontal disease; (4) treatment of periodontal disease; (5) prevention of periodontal disease.

Mornings will be devoted to lectures by well-known researchers and clinicians, and afternoons to small group discussions at which the information will be evaluated under qualified guidance, it is reported. Reports by the evaluating groups will be presented to the Conference on the last day, for discussion, amendment and acceptance.

Registration fee is $25.00. Further information and application blanks may be obtained by writing to Kenneth A. Easlick, University of Michigan, School of Dentistry, Ann Arbor, Mich.

OHIO STATE TO DEDICATE NEW BUILDING IN MAY

The annual Post-College Assembly of the College of Dentistry of the Ohio State University, and the dedication of the new dental building, will be held May 14-15 at Columbus. General chairman is V. L. Steffel, 19 W. Fifth Avenue, Columbus, Ohio.

SECOND BERKSHIRE CONFERENCE IS ANNOUNCED BY TUFTS

The second annual Berkshire Conference in Periodontology and Oral Pathology to be conducted by Tufts College Dental School, Boston, will be held in Lenox, Mass., June 12-16. The conference will comprise four days of lectures, seminars and panel discussions regarding clinical problems by outstanding teachers and clinicians in dentistry, medicine and related fields, it is announced. With headquarters at Eastover, a resort hotel, the meetings are scheduled for mornings and evenings, leaving afternoons free for recreation.

Details may be obtained by writing to The Berkshire Conference, Tufts College Dental School, 136 Harrison Avenue, Boston 11.

OREGON OFFERS FULL YEAR COURSE IN PEDODONTICS

The University of Oregon Dental School offers a full year course in pedodontics beginning July 1. Inquiries should be addressed to Vinson M. Weber, Postgraduate Department, University of Oregon Dental School, 809 N.E. Sixth Avenue, Portland 14, Ore.

SOUTH CAROLINA STATE BOARD EXAMS TO BE HELD JUNE 18

Date of the examinations of the South Carolina State Board of Dental Examiners has been changed from July 4-7 to June 18, 1951.

Information can be obtained from E. G. Bumgardner, secretary of the South Carolina State Board of Dental Examiners, 1517 Hampton Street, Columbia 1.

GRADUATE AND POSTGRADUATE COURSES ANNOUNCED

COLUMBIA

Columbia University School of Dental and Oral Surgery has announced three postgraduate courses in periodontology for the year beginning in September. They are: a two year, full-time course in which emphasis is given to correlation of the fundamental sciences to clinical practice and which leads to a Certificate of Training; a half day a week course from September 26, 1951, to May 19, 1952; and a two week, full-time course from June 2-13, 1952.

Further information may be obtained by writing to Barnet M. Levy, director of the postgraduate division, School of Dental and Oral Surgery, Columbia University, 630 West 168th Street, New York 52.

NORTHWESTERN

A course on cephalometric roentgenography and its application in clinical orthodontics will be conducted May 21-23 by the Graduate Department of Orthodontics of Northwestern University Dental School, Chicago. Tuition is $50.

Details may be obtained by writing to the dean, Charles W. Freeman, Northwestern University Dental School, 311 East Chicago Avenue, Chicago 11.

OHIO STATE

Two postgraduate courses in orthodontics beginning October 8, and a graduate course leading to a degree of Master of Science in Dentistry, are announced by Ohio State University College of Dentistry.

One postgraduate orthodontics course will be offered on a five-quarter, full-time basis; the other will be a six-quarter, half-time course. A certificate will be issued to students who complete them satisfactorily. The graduate course leading to a degree of Master of Science in Dentistry is offered on a full-time, two year basis.

Details may be obtained by writing to the College of Dentistry, The Ohio State University, Columbus 10, Ohio.

International

EARLY SUBSCRIPTION URGED BY INTERNATIONAL CONGRESS

Persons planning to attend the eleventh International Dental Congress of the Fédération Dentaire Internationale in London, July 20-26, 1952, are urged by the organizing committee to remit subscription fees as soon as possible, and to make early arrangements for travel and accommodations.

Congress subscriptions are to be mailed to the secretary general, H. Parker Buchanan, 13 Hill Street, Berkeley Square, London, W 1. Receipt of nearly 300 requests for travel accommodations is already reported by C. W. Carrick of Oberlin, Ohio, a practicing dentist who operates a travel agency in the Oberlin Bank Building, and it is anticipated that reservations may be more difficult to obtain later on.

The Congress, which the organizing committee predicts will be "the largest international gathering in the history of dentistry," will be housed in the newly erected Royal Festival Hall on the south bank of the Thames. The program will include scientific papers, clinical and table demonstrations, scientific exhibits, films of dental interest, a dental trade exhibition and an oral hygiene exhibition. Excursions, banquets, and other social functions will be organized.

Until January 1, 1952, subscription for active membership in the Congress is £5 ($14); for applications mailed after that date, subscription fee is £5 10s. ($15.40). Active membership is open to all dentists licensed to practice; associate membership is open to all dental and medical undergraduates, relatives of members, dental hygienists and technicians, and trade exhibitors.

Individual F.D.I. members of two years' standing or more will be admitted to active membership in the Congress at half the subscription fee.

1951 Annual F.D.I. Session • The Fédération Dentaire Internationale will hold its 39th annual session in Brussels, Belgium, June 9-16, in conjunction with the 25th anniversary of the Journées Dentaires of the Journées Médicales de Bruxelles. The scientific session will be held at the Eastman Institute of Brussels and will be preceded by a formal opening at the Palais des Beaux-Arts and a reception and assembly at the Brussels Town Hall.

Members of the Association who are planning to attend the session are asked to notify the chairman of the Council on International Relations, Stanley D. Tylman, 55 East Washington Street, Chicago 11.

New headquarters of the Canadian Dental Association are at 234 St. George Street, Toronto, Ont. Shown here, the Hon. Paul Martin (center), Canadian Minister of National Health and Welfare, cuts the tape at the opening ceremony February 11, assisted by the presidents of the Canadian and the American Dental Associations, R. P. Lowery (left) and Harold W. Oppice (right) respectively. The entrance door is shown in left insert; at right, the secretary, Don W. Gullett, occupies his new office.

PHILIPPINES STAGE FIRST NATIONAL DENTAL HEALTH WEEK

The Philippine Islands observed National Dental Health Week in February for the first time, with a nation-wide educational program in which public schools, dental schools, dental societies, and dental manufacturers participated. The program was ushered in with a radio address by Juan S. Salcedo, the Secretary of Health, and climaxed by a banquet at the Manila Hotel.

The week was marked by publication in Manila of the first issue of *The Dental Health Educator,* a newspaper type publication containing dental health educational material which includes "Ten Commandments for the Care of the Teeth," and a "Dental Health Guide" by the supervisor of medical and dental services in the Bureau of Health.

The executive committee was composed of the president of the Philippine Dental Association, Pedro A. Banez, and officers and members of dental societies from the provinces, the board of dental examiners, and other dental health organizations, under the chairmanship of Rep. Ricardo Y. Ladrido of Iloilo. The Minister of Health was honorary chairman.

AUSTRIAN DENTISTS PLAN ANNIVERSARY CONGRESS

The Austrian Dental Association (Verein Österreichischer Zahnärzte) will celebrate its ninetieth anniversary at a congress in Vienna September 20-23, with a program of scientific essays and demonstrations at the Pathologic Institute, and technical exhibits at the Dental Institute of the University of Vienna.

Information may be obtained by writing to the secretary, H. Zinner, Wahringerstrasse 25, Wien IX.

Legislation

CHILDREN'S DENTAL HEALTH DAY BILL PASSED BY SENATE

The Children's Dental Health Day bill (S 336), calling for the annual proclamation by the President of the first Monday of February as National Children's Dental Health Day, was passed by the Senate March 12. Sponsored by the Association, the bill was introduced by Sen. James E. Murray (D., Mont.).

Action by the House is expected when more urgent legislation has been cleared.

MAINE CONSIDERS REVISION OF DENTAL PRACTICE ACT

A bill introduced into the Maine Senate on March 7 virtually rewrites the Dental Practice Act not only to insure that only properly qualified dentists perform dental services, but also to require dentists practicing in a specialty to obtain certification in that specialty by the State Board of Examiners. The bill contains authorization for the Board to give examination to applicants for such certification. It further authorizes the Board to apply for an injunction against persons violating the act.

TWO NEW DENTAL LABORATORY BILLS INTRODUCED IN N.Y.

Two laboratory registration bills were introduced in the New York Assembly during January. One bill provides for the biennial registration of all dental laboratories and contains some regulatory provisions as well. The second bill, sponsored by the Dental Laboratory Association of the State of New York, provides for the "registration" of processing laboratories and the "licensing" of technicians.

As recently as 1949, the Dental Laboratory Association of the State of New York reaffirmed the opposition of the American Dental Laboratories Association, of which it is a component, to the accreditation plan, on the ground that it was "monopolistic," and resolved to sponsor and support a bill to register dental laboratories and dental technicians.

A.D.A. URGES CONNECTICUT TO AMEND DENTAL PRACTICE ACT

Enactment of a proposed amendment to the Dental Practice Act in Connecticut, to insure that only properly qualified persons are permitted to render dental services, was recommended by the American Dental Association March 5.

The Association's recommendation was presented by F. J. Garvey, secretary of the Council on Legislation, in testimony before a joint hearing of the Senate and House Judiciary Committees of the Connecticut General Assembly on March 7. Mr. Garvey pointed out that more than 30 states have similarly strengthened their dental practice acts and urged the Committee to enact the amendment in the interest of the dental health of the people of Connecticut.

Public Health

DENTAL HEALTH OFFICERS TO VIEW FLUORIDATION METHODS

State dental directors in seven midwestern states and dental personnel of U.S. Public Health Service, Regions IV and V, will devote the main part of their annual orientation conference April 25-26 to a first-hand study of the fluoridation procedures in operation in Wisconsin cities.

State engineers, state dental society officers, and other interested persons will be invited to join in the program which will include field trips for inspection of the fluoridation methods and equipment in Madison, Crestwood, Oregon, Middletown, Watertown, Fort Atkinson, Janesville, Elkhorn and Racine, according to preliminary plans announced by James F. Lewis of Chicago, dental director for the two USPHS regions.

The seven states in the two USPHS regions are Minnesota, Wisconsin, Illinois, Indiana, Kentucky, Michigan and Ohio.

APHA JOURNAL URGES MORE FLUORIDATION PROGRAMS

An editorial in the February issue of the *American Journal of Public Health* emphasizes the responsibility of the health officer in the field of protective treatment with fluorides. Now that "protective treatment with fluorides has been wholeheartedly accepted by the dental profession . . . the time seems more than ripe for the health officer to awaken to his responsibilities in this field," the editorial states.

The American Public Health Association, which publishes the journal in which the editorial appears, recommended the procedure as "a safe and effective method for reducing the prevalence of dental caries" at its annual meeting last year.

A booklet on water fluoridation, prepared by the Council on Dental Health of the American Dental Association, is available on request from the Central Office. It describes early fluoride studies, summarizes the scientific basis for the adoption of fluoridation, lists national organizations that have approved it, describes the technical procedures for installation, and the cost, and lists firms from which equipment and materials can be purchased.

NATIONAL NEGRO HEALTH WEEK MOVEMENT IS TERMINATED

Termination of the National Negro Health Week movement, conducted since 1932 by the U.S. Public Health Service and cosponsored by Tuskegee Institute, Howard University, the National Medical Association, and the National Negro Insurance Association, has been announced by Federal Security Administrator Oscar R. Ewing. The step is "in keeping with the trend toward integration of all programs for the advancement of the people in the fundamentals of health, education, and welfare," he said.

The movement was an outgrowth of a program initiated by Booker T. Washington 35 years ago, in which health information was brought to the people through churches, schools, civic groups, and health agencies. Since 1932, USPHS had supported the movement by supplying staff, facilities, and materials for nation-wide activities recommended by the executive committee composed of representatives from the sponsoring agencies, Mr. Ewing explained.

According to Surgeon General Leonard A. Scheele, the Special Programs Branch, formerly the Office of Negro Health Work, will continue to serve as a clearing house of information on state and community health programs, health education materials, and programs available for negro groups.

General

TIMMONS TO RECEIVE 1951 FONES AWARD

Gerald D. Timmons of Philadelphia, dean of Temple University School of Dentistry and a former executive secretary of the American Dental Association and trustee, is to be the recipient of the Fones Award at the annual meeting of the Connecticut State Dental Association April 25-27 in New Haven.

Before serving as the executive secretary of the Association, Dr. Timmons served for two years as trustee from the Seventh District. At the same time, he was dean of the Indiana University School of Dentistry, on whose faculty he served for 15 years following graduation with a D.D.S. degree in 1925. He has been dean of Temple University dental school since 1942.

The award, named after the founder of the dental hygiene movement, went last year to William J. Gies of New York. It has been conferred annually since 1922 for "some outstanding achievement in the interest of humanity." Before 1929 it was known as the Newell Sill Jenkins Award.

"TRIGESIC" TABLETS ARE WITHDRAWN FROM MARKET

Trigesic and Trigesic with Codeine tablets have been withdrawn from the market by E. R. Squibb and Sons, following reports of three cases of granulocytopenia possibly caused by their use.

The company states that although in all three patients the side effect disappeared after withdrawal of all possible causative drugs, in only one patient did it appear that Trigesic alone might have caused it. None of the patients has shown any serious complications, it is reported.

According to the manufacturer, the drug was released for sale only after months of careful laboratory investigation followed by clinical trial which included hematological studies, and although millions of doses have been prescribed since that time, only three patients are known to have developed granulocytopenia.

H. L. BANZHAF, FORMER HEAD OF THE ASSOCIATION, DIES

Henry L. Banzhaf of Milwaukee, dean emeritus of the School of Dentistry of Marquette University and a former president of the American Dental Association, died March 5 after a short illness.

Dr. Banzhaf was born in Hartford, Wis., in 1865, and started his dental career in 1886 in Manitowoc, Wis., where he set up a private practice after graduation from the University of Michgian School of Dentistry.

H. L. Banzhaf

He was appointed dean of the Dental Department of the Milwaukee Medical College in 1902 and, when the College became part of Marquette University in 1907, continued as its dean until 1944 when he was honored with the title of Dean Emeritus. In addition, he served as business manager of the University and as a member of the board of trustees from 1920 until his retirement in 1946.

One of his greatest contributions to dental education was his part in organizing the Dental Educational Council of America in 1910, which he served as secretary for ten years and as president for six, and whose functions were relinquished to the Council on Dental Education of the American Dental Association in 1938. He was president of the American Dental Association in 1926-27. He also was one of the founders of the American College of Dentists.

Among honors he received were the degree of Doctor of Laws from the University of Pittsburgh, and the 1924 Medal and Scroll of Honor from the Rhode Island Dental Society.

He is survived by his widow, two sons, and five grandchildren.

ROTARIANS HEAR OPPICE CONDEMN SOCIALIZED MEDICINE

In an address entitled "Teeth and Socialism" before the Chicago Rotary Club on March 6, Harold W. Oppice, president of the Association, cited the accomplishments of the dental profession in the improvement of children's dental health, and described proponents of compulsory health insurance as "advocates of irresponsible socialism" with a totally unrealistic approach to the problem of dental disease.

In a Government health scheme, children would be neglected and "would be crowded out by adults seeking remedial dentistry," he said. Thus dentists would have "little or no time to carry out essential preventive services."

Typical of programs carried out by dental societies in the field of preventive dental health education is the program in Chicago schools worked out by the Chicago Dental Society, Dr. Oppice told the Rotarians. The program includes classroom instruction, orientation courses for teachers, and a system of dental inspection, referral and follow-up in which last year 92,000 school children were given dental examinations and referred for treatment to their family dentists or to dental clinics operated by the Chicago Board of Health.

Another example of the accomplishments of the profession is the fact that after research by the profession regarding the cause and control of caries, more than 70 U.S. cities are now fluoridating their water supplies, he stated, and added his urging to that of the Chicago Dental Society that Chicago also adopt the fluoridation process.

ERROR IN ARTICLE BY TANK IN MARCH JOURNAL CORRECTED

The editorial department regrets to announce an error in the March JOURNAL in which two illustrations were transposed.

In the article by Gertrude Tank entitled "Two Cases of Green Pigmentation of the Deciduous Teeth Associated with Hemolytic Disease of the Newborn," the illustration at the bottom of page 304 should have appeared above the legend for Figure 3 on page 305; the illustration at the top left of page 305 should have appeared above the legend for Figure 2 on page 304.

3,000 PACIFIC COAST DENTISTS TO MEET IN SEATTLE IN JUNE

Dental societies of eight western states and two western Canadian provinces will be represented at the eighth Pacific Coast Dental Conference in Seattle June 25-28 which is expected to draw an attendance of 3,000 dentists.

Plans for the program include the following subjects and essayists: full dentures, by Carl O. Boucher, professor of dentistry (prosthetic dentistry) at Ohio State University; operative dentistry, by W. J. Simon, professor of operative dentistry and chairman of the division of

oral diagnosis at the University of Minnesota; the pharmacology, biochemistry and bacteriology of local anesthetics with special emphasis on alkaline solutions, by C. D. Husband, honorary lecturer in local anesthesia at the University of Alberta; practice management, by James Robinson, executive secretary of the Southern California Dental Association; and oral surgery, by G. T. Gregory, assistant professor of oral surgery at Indiana University dental school. LeRoy M. Ennis, president-elect of the Association, will lecture on diagnosis and roentgenogram interpretation. Harold W. Oppice and Harold Hillenbrand, president and secretary of the Association respectively, will be guests.

Details may be obtained by writing to the secretary, Clyde R. Flood, 605 Medical Dental Building, Seattle 1.

TEMPLE ALUMNI TO MEET IN PHILADELPHIA IN MAY

Temple dental alumni will hold their annual meeting May 9-10 at Temple University School of Dentistry, Philadelphia.

Chairman is O. H. Kayser, First National Bank Building, Princeton, N.J.

TUSKEGEE TO HAVE DENTAL HEALTH ASSEMBLY THIS MONTH

A dental health assembly will be held April 9-12 in Tuskegee, Ala., under the joint sponsorship of the John A. Andrew Clinical Society of the dental section of Tuskegee Institute, and the dental service of the Veterans Administration Hospital, Tuskegee.

The program will be comprised of presentations and discussions by dentists, physicians, health educators, nutritionists and public health workers, with the intent of "effecting the philosophy that only in a full scale cooperation between all the members of the health teams can there be any durable constructive benefits to local communities, to states, to regions or to nations," according to Clifton O. Dummett, program committee chairman.

Further details may be obtained by writing to Dr. Dummett at the Veterans Administration Hospital, Tuskegee, Ala.

ASSOCIATION OF ENDODONTISTS INSTALLS NEW OFFICERS

The American Association of Endodontists held its annual meeting in Chicago on February 3 and installed George C. Sharp of Pasadena, Calif., as president. Other officers elected were F. D. Ostrander of Ann Arbor, Mich., president-elect; L. A. Lucas of Oklahoma City, vice-president; N. W. Burkman of Birmingham, Mich., secretary; V. B. Milas of Chicago, treasurer.

ACADEMY OF DENTAL MEDICINE TO MEET IN ATLANTIC CITY

The American Academy of Dental Medicine will hold its fifth annual meeting in Atlantic City June 22-24.

Guest speakers will include Ashley Montague, anthropologist; John A. Kolmer, professor of medicine at Temple University; and Eli Goldsmith, endocrinologist and histologist.

Members of the Association are invited. Further information and reservations may be obtained by writing to Lester B. Older, 2115 New York Avenue, Union City, N.J.

NATIONAL HEALTH COUNCIL TO MEET IN NEW YORK THIS MONTH

The National Health Council will hold its thirty-first annual meeting April 6 in New York. The Association, which has been an active member of the Council since February 1950, will be represented by Harold Hillenbrand, secretary. Both Dr. Hillenbrand and Allen O. Gruebbel, secretary of the Council on Dental Health, are members of the board of directors.

International Correspondence

NEWS FROM GREAT BRITAIN

HEALTH CENTRES

Health centres have not as yet taken the place in the National Health Service that was once anticipated for them. Before the Health Service commenced it was believed that this new departure in British medicine and dentistry would follow soon after the scheme was launched. But a month or so before the scheme started Mr. Bevan, the Minister of Health, announced that their building would be delayed as he had been faced with a choice between health centres and houses. Quite naturally he chose to build houses. It was then speculated that a certain number of health centres would soon be built as a token of the Government's intention to follow this method of state medical practice. So far this speculation has not materialised.

Health centres have nevertheless been in the dental news lately. At the last meeting of the Representative Board of the British Dental Association, the Health Centres Committee of the Board submitted a report containing recommendations for conditions of service in such centres. It is probable that at least three centres are shortly to be built in Northern Ireland, and the B.D.A. was naturally anxious to have a policy to meet the circumstances which would arise when the buildings were ready for occupation.

As has already been mentioned the health centre idea is a new departure from our traditional way of medical and dental practice. It is customary for most general medical and dental practitioners to practice at their homes. The new plan envisages physicians and dentists practicing, perhaps as full time employees, at a centre, where each would have his own consulting room and see his own patients. At the centre there would be adequate secretarial, nursing and medical auxiliary services such as roentgenography and physiotherapy. Generally speaking this appears to be an unpopular plan despite certain obvious advantages of service. It would relieve the physician's wife of much responsibility, as under the present system she has to see that there is some one at home to answer the phone, and she frequently has to undertake the time consuming effort of contacting the doctor on his rounds when an urgent call comes to his house. This type of burden does not arise in dental practice. The Representative Board was recommended that:

> Health centres should be opposed unless a very strong case can be made out for the establishment of a health centre in any particular area. Where the case can be made out for the establishment, the dental centre should normally be regarded as a department only of a general health centre covering comprehensive health services.

The Board had already expressed the view in 1949 that:

> Dental treatment in health centres should be limited to the priority classes (expectant and nursing mothers, preschool and school children) until such time as the whole dental service is integrated under a single government department and conditions allow or make it desirable that general dental treatment may also be provided in them.

This view was again endorsed. At the same meeting in 1949 it was also agreed that:

> A step which should be taken without delay is the establishment of a limited number of experimental health centres in which opportunity would be afforded to study the working effects of differing systems of remun-

eration for dental practitioners working in them and undertaking general dental service.

In view of the present circumstances the committee now thinks that the centres should be built only in the new satellite towns which the Government is building. It is pointed out that there is no existing private practice in these towns and that there would be no alteration of existing conditions such as would be inevitable in established communities. If the health centres do become a recognized feature of the health service, then it is recommended that the dental practitioners who would work in them should pay for the accommodation which they occupy and perform treatment in the centre under the conditions applicable to the ordinary practitioner working in his own surgery. To meet the possibility that only full time salaried practitioners will be engaged to work in the centres, the committee made certain recommendations concerning such items as responsibility, hours of work, evening sessions, holidays, security of tenure, collection of fees, anaesthetists, and so forth.

HEALTH SERVICE COSTS

The Chairman of the Westminister Bank, in a statement issued with the Bank's report and accounts, writes:

> Some people probably still believe it is free: some probably think that their weekly National Insurance contributions pay for the service . . . the proportion of the cost to be met in the current financial year by contributions is now less than one-eleventh.
>
> Whether the individual realises it or not the cost of the Health Service involves a burden of about £9 per head per annum coming either directly from contributions or income-tax, or indirectly through purchase tax, entertainment tax or otherwise. Until this fact is generally grasped we shall not get economy in the use of the service.

THE DENTAL SERVICE IN NORTHERN IRELAND

The Northern Ireland Health Services Board has recently issued figures relating to the General Dental Service under its control. Two hundred and seventy-three dentists with 34 assistants in the scheme treated 266,980 patients. Of these, 186,408 received conservative treatment and 24 per cent of the total number of estimates received related to patients receiving further treatment under the scheme. The total cost for the year 1949-50 was £1,143,865, an average of about £4 5s. per patient, giving an average income per dentist of about £3,700. About 3 per cent (8,259) of patients were asked to appear before the Regional Dental Officers for examination. Approximately 70 per cent of the patients had some conservative treatment. About 21 per cent of the population received dental treatment and only about 5 per cent of the population were having regular treatment.

John Boyes

Cases and Comments

PSYCHOSOMATIC AND NUTRITIONAL FACTORS RELATED TO RECURRENT NECROTIZING ULCERATIVE GINGIVITIS

By Harry Roth, D.D.S., Assistant Professor of Periodontia, and Arthur Stone, D.D.S., postgraduate periodontia student, New York University College of Dentistry, New York.

E. K., an attorney, age 39, came for treatment to the periodontia department of New York University College of Dentistry in January 1950 with the complaint of bleeding and painful gingivae along with bad breath.

History • The dental history revealed that there had been an attack of acute necrotizing ulcerative gingivitis three months earlier. In October 1949, the patient had been stricken with virus X infection which had left him in an extremely weakened condition for several months. Because of overwork during convalescence, he was on the verge of an emotional and physical breakdown. In the latter part of 1946 and early part of 1947, he had suffered from a sinus infection complicated by a postnasal drip. He had had the usual childhood diseases.

Clinical Examination • On examination, the floor of the mouth and palate appeared normal. The upper gingivae were edematous and light red in color. The lower anterior gingivae were dark red and the lower posterior gingivae were light red in color. All the lower gingivae were edematous. Spontaneous bleeding of the gingivae was noticed in all parts of the mouth, but it was more severe in the lower anterior region. A pseudomembrane was present over most of the interproximate areas. Examination of the tongue revealed hyperkeratinization along with a brownish-yellow discoloration on its dorsal surface. The lower right second molar and the lower left first molar responded negatively to the pulp vitality test.

Roentgenograms revealed slight destruction of the alveolar crest of most of the upper and lower teeth. There was an incomplete root filling of the right second molar but no periapical involvement. A radiolucent area was seen on the apical area of the mesial root of the lower left first molar.

Diet Evaluation • Evaluation of the diet showed a decided lack of vegetable and milk intake. In addition it was found that the intake of refined carbohydrates was excessive. The diet was lacking in essential vitamins and minerals because of the preponderance of refined carbohydrates and lack of so-called protective foods.

Treatment • Box[1] and Roth[2] have both reported the causal relationship between ascorbic acid deficiency and acute necrotizing ulcerative gingivitis. It was decided to study the effect of massive doses of vitamin C on acute necrotizing ulcerative gingivitis. Four 250 mg. tablets of vitamin C daily were prescribed for one week. This very large dose of vitamin C was the only treatment received by the patient during the week. At the end of this period, the hyperkeratinization of the tongue had decreased, oral fetor had diminished, and pain had disappeared. The patient felt less tired and gingival bleeding was only slight. The administration of vitamin C was discontinued at this time and the patient was instructed to return in one week. On re-examination the necrotizing ulcerative gingivitis had recurred.

Routine periodontal treatment was now instigated in an effort to check further progress of the disease. Scaling, curettage and equilibration were carried out. A maintenance dose of 250 mg. daily of vitamin C was recommended as well as water irrigation of the mouth following meals. The patient was instructed repeatedly on proper use of the toothbrush. Cooperation in home care was poor.

Psychosomatic Aspect • While the patient was under treatment, he was overworked and in a state of prolonged tension. During the latter part of the treatment, when his legal and personal matters were successfully concluded, a marked improvement was noticed in his attitude and personality. He was now more amenable to suggestions on toothbrushing and home care. The insomnia, loss of appetite and fatigue disappeared. A dramatic improvement of the gingivae occurred with complete cessation of abnormal bleeding.

Summary and Conclusions • 1. In cases of intractable, recurrent necrotizing gingivitis

1. Box, H. K. and Ham, A. W. Necrotic gingivitis. Oral Health 32:731, 1942.
2. Roth, H. Vitamins as an adjunct in the treatment of periodontal disease. J.A.D.A. 32:60 (Jan.) 1945.

with acute manifestations, other than local causal factors must be sought.

2. Administration of 1,000 mg. daily of vitamin C produced the following improvement: (a) cessation of abnormal bleeding; (b) disappearance of interproximal pseudomembrane; (c) marked improvement in gingival tone and color; (d) decrease in brownish-yellow hyperkeratinization on tongue; (e) disappearance of pain in gingivae; (f) reduction in mouth taste and odor; (g) patient did not tire easily and felt more energetic.

3. All subjective and objective symptoms returned soon after vitamin C was discontinued.

4. When the patient's emotional and physical strain terminated, the rate of response to treatment was markedly accelerated.

5. Emotional and physical strains as well as malnutrition may be considered contributory causal factors in acute necrotizing ulcerative gingivitis.

156 East 52nd Street

CONGENITAL ABSENCE OF LOWER RIGHT LATERAL INCISOR

By Joseph Winkeller, D.D.S., Brighton, Mass.

A married woman, 25 years of age, came to this office for routine dental treatment. Clinical and roentgenographic examination showed the absence of a lower anterior tooth, although the patient claimed that in the past only one tooth—a lower right third molar—had been extracted. The arrangement of the lower anterior teeth was such that the absence of a tooth was not immediately observable; moreover, the patient had not known that it was missing. All other teeth were present. The symmetry of the lower arch was excellent and there was no malocclusion. Roentgenograms (see illustration) showed also that both lower central incisors had incomplete root formation. The missing tooth was judged to be the lower right lateral incisor.

Congenital absence of lower right lateral incisor and incomplete root formation of both lower central incisors

There was no family history of congenital absence of teeth. However, the patient had been a premature baby, born at seven months. The mother had been ill during most of her pregnancy with much vomiting and nausea.

It would seem that the etiology of the condition might be based on a prenatal disturbance of tooth germ formation.

1462 Commonwealth Avenue

MULTIPLE SUPERNUMERARY BICUSPIDS

By Lawrence Heiman, D.D.S., New York.

A 38 year old negro male veteran, a native of Barbados, reported to the Veterans Administration dental clinic June 7, 1949, with a dental emergency. During examination of the mouth several supernumerary bicuspids in the maxillae and mandible were discovered. Intraoral roentgenograms disclosed additional supernumerary biscuspids.

Two supernumerary bicuspids were present in the right maxilla. One was in a position normally occupied by the cuspid with the cuspid impacted above it. The other was lingual to the normal second biscuspid. On the left side two supernumerary biscuspids were present. One was lingual and distal to the cuspid. The other was impacted above the normal second biscuspid.

In the left mandible two supernumerary bicuspids were present. One was lingual to the normal first and second bicuspids. The other was impacted distal to the second bicuspid. In the right mandible one supernumerary bicuspid was impacted mesial to the second bicuspid.

Of the seven supernumerary bicuspids discovered three were impacted. Treatment consisted of removal of all supernumerary teeth which were malposed and creating periodontal disturbances.

252 Seventh Avenue

Reviewed in the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the author do not necessarily reflect the opinion or policy of the Veterans Administration.

A STILET FOUND IN SOFT TISSUE AFTER A REGIONAL NERVE BLOCK

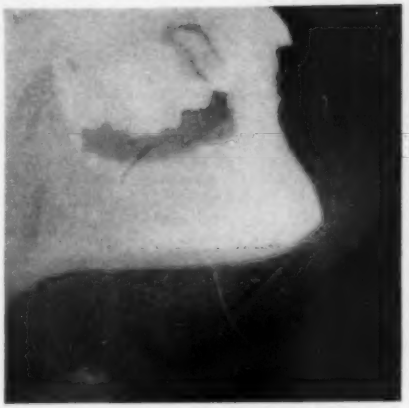
By Gustave Rosenburg, M.D., and Fritz Popper, M.D., Forest Hills, N. Y.

A 49 year old man presented himself for examination on June 14, 1950, because of increasing pain and discomfort in the midline region of the neck. About two months previous to the examination, the patient had received dental treatment. Additional history received from the dentist revealed the patient had been given a regional nerve block and that extraction of a right lower molar had been performed without complication. The patient was advised to return for the removal of an iodoform packing which had been inserted into the socket. The patient failed to return.

Examination revealed that the man was in good general condition. There was no discoloration, no swelling or change of outline visible around his face or neck. The patient pointed to an area below the chin as the site of his pain. A hard stick-like resistance was discovered by palpation of the skin in this region. A roentgenogram taken the same day revealed a long thin foreign body with no relationship to the jaw bone (illustration). Under local anesthesia, an incision was made just above the point of resistance. The foreign body proved to be a stilet, 2⅛ inches in length, which was easily removed. Healing was uneventful.

It may be assumed that the stilet had inadvertently been left in the needle when the procaine injection had been given. The stilet probably did not fit tight enough to close the needle completely and thus it was pushed into the soft tissue together with the procaine. As long as the stilet was immobile it did not cause any symptoms or discomfort. After it started to migrate, one end of it came to rest against the skin of the neck. This caused the pain for which the patient sought medical advice.

108-25 Seventy-second Avenue



A long thin foreign body, with no relationship to the jaw bone, below the chin

Advances in Science • From the age of Galileo through the first half of the 20th century the scientific movement has been led by the physical sciences. These sciences still retain indisputable supremacy as wellsprings of technological progress. But in our age more and more of the intellectually and philosophically significant advances in knowledge appear in the realm of biology. Man's deepest urge, after all, is to understand himself and his place in the Universe—to fathom his own nature as a living organism and the interactions between heredity and environment that shape the development of his body and mind. *Theodosius Dobzhansky, "Genetics," Scientific American 183:55, September 1950.*

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editors reserve the right to edit all communications to fit available space and require that all letters be signed. Signatures will be deleted before publication at the request of the author. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

COMMENTS ON DR. GRUEBBEL'S REPORT

According to Dr. Gruebbel's report on the New Zealand school dental nurse plan, it has been anything but a success.

Some of the main reasons that the school dental nurse plan in New Zealand is not more of a success are (1) it is not compulsory; (2) it does not begin early enough and (3) it is not carried through the adolescent years when dental decay is so prevalent.

I have advocated for a great many years that we in America train men and women to render the dental service that the normal child needs from the time of the eruption of the first deciduous tooth until that child graduates from high school. The child with abnormal conditions or the child who meets with an accident can always be taken to a specialist.

I would not call these trained men and women dental nurses. I would call them "school dentists."

I am sure that the dental profession of America cannot repudiate the following statements:

1. The less dentistry that is done for the child of preschool, grade and high school age, the more complicated will be the dental needs of that child when he becomes an adult.

2. It is the simple dental service rendered to the child that reduces to a minimum the complicated dental service needed by the adult.

3. If all the dental needs had been corrected in the last 20 years, by compulsion through our school system, there would not be the great number of rejections at our Army recruiting stations on account of bad teeth.

4. If it takes six years of training, after high school, to equip one to render dental service to the normal child, it is evident that the same amount of training is not enough to render the more complicated dental service needed by an adult.

5. The first dental care that any normal child of preschool age needs is simple, and if that is given when it should be, the next, if taken in time, will also be simple and so on through the preschool, grade and high school years.

6. American dentistry cannot say that it has succeeded until it saves the teeth of America's youth, undevitalized and uncrowned.

7. If the state can demand a physical examination before a marriage license is granted, it can demand dental service for the child of preschool, grade and high school age.

8. As long as tooth decay of our children of preschool, grade and high school age is uniform and universal, and our school system is uniform, universal and compulsory, let's take care of the children's teeth through a uniform, universal and compulsory dental system, and render that service through our school system, by men and women specially trained to render that service. They should have offices in the school buildings.

George Schneider, D.D.S., LaSalle, Ill.

DENTAL ROENTGENOGRAPHY SADLY NEGLECTED

It is amazing to learn how many dentists neglect to make general roentgenographic examinations of their new patients. There are also a large number of dentists who fail to make roentgenograms for every diagnosis, especially before and after each extraction.

Any dentist can become proficient in rendering roentgenographic service. It stamps a dentist as a scientific man to have his patients mention that "my dentist believes in taking x-rays first before he starts the necessary dental

work." Besides, the remuneration for this added dental service is worth while. It is impossible for any dentist to perform good dentistry by relying solely on clinical diagnosis.

Not only must the average dentist become proficient in periapical roentgenography but he must improve himself in bitewing roentgenography as well. All these technics can be studied in postgraduate courses at various dental schools. Often your local or state dental society meetings have available for their members excellent courses in dental roentgenology. How many dentists avail themselves of this valuable aid to our dentistry? Very few! Too many dentists today are too busy making money to bother with these refresher courses. They had better watch out. For this apathetic attitude means added strength for President Truman's socialized health plans.

The most important person in this problem is the average patient. When we fail to make roentgenographic examinations of our patients we are doing a grave wrong, for we are practicing guess work dentistry which has no place in our profession today.

Dentistry is considered a branch of medicine. It is a proud profession which includes all the basic and learned sciences. Any dentist who does not practice honest-to-goodness dentistry has no place in our profession. Good dentistry is directly dependent upon good dental roentgenology.

In malpractice suits verbal evidence will be of little, if any, value in court if contributory negligence on the part of the patient is used as a defense. It is necessary to keep proper and complete records. Roentgenograms taken before and after extractions are the best defense in case of suit. Without proper roentgenograms, you as a dentist wouldn't have a "leg to stand on" in court.

These dental roentgenograms will support the dentist if he is charged with negligence, especially in tooth extraction. The roentgenogram taken before extraction will disclose the extent of infection, the position of the tooth, the shape of the roots and any other tooth anatomy. Roentgenograms taken following the extraction will show the presence of fragments, and so forth, and this is an excellent defense in case you need defense.

Should the occasion arise when a dentist has to defend himself in court, he should take along not only the roentgenograms but also enlarged photoprints of the same for judge and jury to scrutinize. These will help his case greatly.

Dentistry today is a noble but laborious profession. The constant use of roentgenography in our daily work will make our labor much better and easier. Let us, as good dentists, take advantage of this excellent adjunct to our practice. Thus the dental health standards of America will be commensurately enhanced.

Charles A. Levinson, D.M.D., Boston

Book Reviews

A REPORT ON NEW ZEALAND SCHOOL DENTAL NURSES

By United Kingdom Dental Mission. 43 pages. Price 1s. 3d. (18 cents). London, His Majesty's Stationery Office, 1950.

This report was the result of an inspection trip made in New Zealand by five prominent British dentists "to obtain first hand information as to the work and training of New Zealand School Dental Nurses." The project was under the auspices of the British Ministry of Health. The mission spent three weeks inspecting dental nurses training schools and "about" 50 public school dental clinics operated by graduate dental nurses. The mission saw "more than 100 dental nurses at work in the clinics." The report states that members of the mission made "clinical observations" at all facilities visited.

The report also includes the following data: a short history of the inception and development of the New Zealand School Dental Nursing Service, the training program of the school dental nurse, organization and administration of the School Dental Service, location and equipment of clinics, the scope of treatment, costs of dental service, and treatment reports, to mention the most important. Appendixes documenting the above items are included.

The findings of the dental mission as regards the dental services provided by the New Zealand school dental nurses and as stated in the conclusion of the report are as follows: "We are of the unanimous opinion that the training of the New Zealand school dental nurse has resulted in a high standard of technical efficiency in the treatment of children within the limits laid down and we further consider that subject to staffing limitations, the dental nurse system in New Zealand meets an urgent need."

The major purpose of this study, as in the case of other studies made of the New Zealand Dental Nurse System, has been to evaluate the capability of this type of subprofessional personnel to fill and extract teeth for children. It is unfortunate in the case of this study that some evaluating standards were not mentioned in the report. Scientifically tested methods for evaluating the quality of dental treatment procedures have not been established. However, it is practical within certain limits to make comparative evaluations of the quality of such technics as those of filling teeth between different groups of dental practitioners. In this instance the British Dental Mission could have selected a comparable group of British school children and compared the fillings placed by British dentists with those placed in New Zealand children by dental nurses. Such a comparative evaluation would require the setting up of standards of examination, technics of cavity preparation, restoration of tooth form and so forth. Also the accepted criteria of sampling would have been met.

This report fails to state whether any or all of these standards were established and used in arriving at their conclusion.

Frank C. Cady

THE EFFECTS OF ATOMIC WEAPONS

Prepared for and in cooperation with the U. S. Department of Defense and the U. S. Atomic Energy Commission under the direction of the Los Alamos Scientific Laboratory. Edited by Samuel Glasstone. 456 pages. Index. Price $1.25. Washington, D. C., U. S. Government Printing Office, 1950.

The publication of this book marks the appearance of the second of the primary reports of the Atomic Energy Commission on general aspects of atomic weapons. The first release was the well known Smyth report on *Atomic Energy for Military Purposes.* Both of these reports should be read and their contents thoughtfully considered by all dentists. Together with the great benefits to dentistry to be achieved through the availability of radioactive isotopes, there comes the potential production of materials for weapons. *The Effects of Atomic Weapons* presents, in sufficiently nontechnical language for the serious reader to follow, a survey of the effects of atomic weapons exploded (1) in the air, (2) at the ground surface and (3) under water. This book is the principal source of information for defense planning and is commended by Paul J. Larson, director of the Civilian Mobilization Office, as a source of scientific information for technical personnel engaged in civilian defense planning.

There is a chapter on "Decontamination," another on "Effects on Personnel." The latter contains a section on "Pathology of Radiation

Sickness." Another chapter is devoted to the subject of "Protection of Personnel." For those interested in the effectiveness of the bomb there is a section in the appendix on "An Approximate Method of Computing the Deformation of a Structure by a Blast Wave."

The book is well written and easily understood. The long list of authors includes virtually all who have contributed substantially to the development of the atomic energy program.

It is startling to view the photographs and to realize, as is shown on page 214, that a wooden pole 6,700 feet from zero point was ignited by thermal radiation in one of the Japanese explosions.

William Ward Wainwright

SANTA CLAUS, M.D.

By W. W. Bauer, M.D. 266 pages, with appendix. Price $2.75. Indianapolis, Bobbs-Merrill Co., 1950.

This book presents the position of organized medicine (the American Medical Association) on compulsory health insurance. A more understandable title for the book would be "Uncle Sam, M.D." since its purpose is to show how the Federal government would function as the purveyor of medical care to the people. The major thesis is to explode the contention of certain representatives of the Federal government that more and better medical care could be provided by the Government and that Uncle Sam would foot the bill. The author shows, and in an effective manner, that the proposed Federal socialized medicine program would be more expensive to the individual through increased taxes. It also would be less personal, less efficient and be politically controlled. The author failed to bring out the political potency of a government controlled medical care program. Even a brief reference to the politically powerful position of the Minister of Health who is virtually in control of medical services in Great Britain, would be effective in frightening most liberty loving Americans.

This book also disputes the contention of socialized medicine advocates that the people of the United States, under the present system of medical care, are in bad shape physically. This contention is supported by a twisting of draft statistics and sickness surveys. And with this misinformation goes the assurance that with government controlled medical care everybody would get free medical treatment and be restored to health.

The book, written for laymen, is timely and warrants a wide circulation, especially among those of our citizens who have been confused by the rosy promises of a Federally controlled medical care program.

Frank C. Cady

REUNION MEETING, DEPARTMENT OF ORTHODONTIA, UNIVERSITY OF ILLINOIS, 1948

By the Department of Orthodontia, University of Illinois. 228 pages with 197 illustrations. Index. Price $6. Appleton, Wis., The Angle Orthodontist, 1950.

This volume is principally a record of orthodontic study at the College of Dentistry, University of Illinois. It contains the papers and abstracts presented at the reunion meeting of the alumni of the graduate department of orthodontia, University of Illinois, held in Chicago March 28 to April 3, 1948. The book was not published, however, until 1950.

It contains a number of excellent contributions by alumni members including Silas J. Kloehn, Earl W. Renfroe, Abraham Goldstein, Chester F. Wright, Wendell L. Wylie, William B. Downs, John R. Thompson, Edmund H. Wuerpel, Frederick B. Noyes, Ernest Meyer and Allan G. Brodie. The biographical sketch of Edward H. Angle by Edmund H. Wuerpel and the historical article on the Angle College of Orthodontia and the establishment of graduate work at the University of Illinois by Frederick B. Noyes are particularly interesting. Most dentists will find that the article entitled "Facial Clefts and Their Surgical Management in View of Recent Research" by Wayne B. Slaughter and Allan G. Brodie very informative.

The book is generously illustrated and should be of real value to all who are interested in the progress being made in the study of dentofacial development and the correction of abnormal conditions.

Charles R. Baker

Current Literature

ANESTHESIA IN PROLONGED DENTAL CASES

Harry M. Slater, M. D. and C. R. Stephen, M.D. Anesthesia and Analgesia. 28:339. November-December, 1949.

The members of the Department of Anesthesia of the Children's Memorial Hospital, Montreal, have evolved two technics for dental anesthesia in children, especially considering those cases which require a long anesthetic for the completion of operative and restorative procedures.

Four hundred cases in the dentist's office and in the dental clinic have had anesthetic induced by nitrous oxide but carried through the anesthesia stage on trichlorethylene (Trilene). The principal advantage of Trilene is that it is not irritating to the respiratory tract, and according to research is believed to be nontoxic to the liver and produces the minimum changes in the lungs, liver and kidney. Children are usually administered the anesthetic without premedication, although sometimes a barbiturate may be used effectively. Induction is with nitrous oxide 100 per cent until the patient is unconscious, then adding 20 per cent oxygen with a small quantity of Trilene. In most cases the dental mask can be used from the beginning, but occasionally the face mask is required in the initial stages. Toward the end of the operation the Trilene is discontinued and the operation finished with nitrous oxide and oxygen. The advantages are the wide margin of safety, the low incidence of postoperative nausea, the rapid recovery period, a pleasant induction, and the very satisfactory results that have been obtained.

Another method which has been used in 75 cases is endotracheal nitrous oxide with oxygen following the use of sodium pentothal, intocostrin or *d*-tubocurarine chloride. This method of anesthesia has been used particularly for dental procedures where as many as 15 teeth have been filled at one time or for full mouth extractions and difficult extractions. The children awake with all reflexes present and are able to take care of themselves within an hour. Results from this method have been very satisfactory.

Intubation under direct vision is either nasal or oral, with a few instances by blind nasotracheal introduction. Tubes are well lubricated with a 2 per cent nupercaine ointment in a water soluble base. This aids in obtunding laryngeal and pharyngeal reflexes. The tube is connected with a partial rebreathing Foregger valve and bag through which nitrous oxide and oxygen (4:1) is delivered. Controlled respiration is instituted immediately and maintained until the end of the operation.

Charles W. Freeman

PSYCHOSOMATIC FACTORS IN ORAL DISEASE

A. G. Chavoor. The Bulletin of the U.S. Army Medical Dept., 9:987. December, 1949.

Captain Chavoor has described psychosomatic medicine as a study dealing basically with the relationship of psychologic disturbances to pathologic structural changes. Psychosomatic dentistry therefore is concerned with the interrelation of mental health and the health of the oral tissues.

Examples of the effects of emotional tension of the body can be found in some common psychosomatic expressions, such as: "We are moved to tears, paralyzed by fear, breathless with excitement, gnash our teeth with rage," and so forth. These, plus other evidence, show the vital function a person's emotional life plays in maintaining the physiologic equilibrium.

He suggests there is a possibility that the chemistry of the saliva is altered by chronic emotional tension. For example, the buffer state of the saliva may be changed due to autonomic stimulation, thereby lowering the threshold of resistance in the mouth and leaving it open to attack by microorganisms.

Also, changes in blood supply to the various tissues due to vasodilatation or vasoconstriction may upset the fine balance and lead to disease. For example a chronic vasoconstriction would interfere with nourishment of the cells, thereby weakening them so that bacterial invasion is made easy. This inadequate circulation as a result of vasoconstriction, which is part of nervous tension, could also be manifested on the cells of the salivary gland. The serous and mucous cells which secrete ptyalin and mucin will not function properly with a deficient blood and oxygen supply, therefore upsetting the chemistry of the saliva.

Other psychologic factors covered in this paper are: (1) emotions relating to surgical

operations; (2) psychosomatic factors in the etiology of periodontal diseases, which include the effects of vasospasm, fingernail biting, excessive grinding of teeth, taste perversion and so forth; (3) emotions and neuralgia and, finally, (4) a study of idiopathic orolingual discomfort was made on 14 patients with all but one showing anxiety, emotional conflicts and the occurrence of the menopause.

Summing up the paper, Captain Chavoor has suggested that the word "psychodontia" might appropriately be used to replace the term "psychosomatic dentistry."

Melvin P. Baken

DENTAL CAVITIES IN THE GOLDEN HAMSTER

J. D. King. Brit. Med. J. No. 4658, p. 876, April 15, 1950.

In previously published works, King has contended experimental dental caries in the hamster arose in the cementum of the molar tooth roots. Disintegration of the coronal portions occurred as secondary extensions of these lesions. In addition, the lesions appeared to have been associated with a form of periodontal disease associated with calculus deposition. He noted these observations are not in accord with many investigators and believed "much further investigation is necessary before this suggestion [that is, the contrary views of other investigators] can be seriously entertained."

This article summarized the first of a series of studies on the effects of replacing the cereal of caries producing diets by refined and raw cane sugar. No definite conclusions were drawn from the new data, but he believed the general observations (relative to the mechanism of hamster caries) were in accord with his previously reported investigations.

D. S. Chernausek

ETIOLOGY, SYMPTOMATOLOGY, AND THERAPY OF APHTHOUS STOMATITIS

Victor H. Dietz. Mil. Surgeon 107:175, September, 1950.

A description of the various appellations for aphthous stomatitis is given. The original investigations leading to the establishment of this disease as of virus origin are reviewed. The size of the virus of herpes simplex has been substantially established at about 150 millimicrons in diameter. Apparently 70 to 90 per cent of adults exhibit a high titer of antibodies to the virus.

Inclusion bodies are demonstrable in naturally occurring human lesions of those artificially produced in animals. Of the histopathologic features, the appearance of type A intranuclear inclusion bodies and "balloon cells" are characteristic, but not necessarily pathognomonic, of herpetic lesions. Skin tests, using a standardized dose of herpes virus cultured upon amniotic fluid, have been proposed and demonstrated. The test is for the herpes simplex virus. It is assumed by many workers that the virus may enter the body early in childhood and that it parasitizes the body cells for the remainder of life. As such, the immunologic mechanism appears to be of the "all or none" variety.

Aphthous ulcers are clinically observable in two stages: first vesicular, lasting for less than a day, and then ulcerous, lasting ordinarily one to three weeks. Trauma, low resistance, febrile diseases, digestive disturbances, and certain foods, have been variously designated as the exciting agent in certain individual instances. A cyclic variety of aphthous stomatitis has been observed by a number of investigators to occur in women. "Allergenic agents" such as nuts, cheese, chocolate, caviar, or a barbiturate have been suspected in individual instances as the exciting cause. There have been reports of epidemics of a herpetic stomatitis and pharyngitis. These, like aphthous stomatitis, appear to be self limiting.

In the therapy of aphthous stomatitis, topically applied caustics and astringents affording some symptomatic relief are still very much in vogue. The use of a nonspecific (smallpox) and a specific virus vaccine has apparently proved beneficial in certain patients. Other patients may prove the administration of the vitamin B complex more efficacious.

Sumter S. Arnim

ANTIBACTERIAL AGENTS IN THE TREATMENT OF PERIODONTAL DISEASE

T. C. Daniels. J. Periodont. 21:66, April, 1950.

The article is concerned with the anti-infective agents which are used to supplement conservative procedures in the treatment of periodontal lesions. The nature of periodontal lesions requires the use of surface active agents in order to bring the anti-infective agent into contact with the affected surfaces. The uses and advantages and disadvantages of the following antibacterial agents are discussed briefly: peroxides, sulfonamides, penicillin, tyrothrycin, bacitracin, polymyxin A, aureomycin, chloromycetin, 9-Aminoacridine, and nitrofurazone.

William A. Peterson

DENTAL CRISIS

Alexander MacGregor. The Lancet 258: 505, March 18, 1950.

The dental part of the National Health Service has now been in operation for one and a half years, and all is far from well. For the average dental surgeon working under the scheme there is little incentive to do work requiring extra time and skill, and his incentive is bound to become more and more financial. The emphasis has come to be more on quantity than quality.

With fewer dental surgeons today than in 1939, the profession is understaffed and overworked. Will new recruits enter the profession if they know that immediately upon qualification they will enter a career where fillings have to be turned out in quantity daily with little to alleviate the monotony?

If routine fillings were done by ancillary workers in a clinic under the supervision of a qualified dental surgeon, far more work could be undertaken, and the number of qualified men required proportionately decreased. Technicians undergoing training would probably derive some benefit from a short preclinical course, and the main emphasis would be placed on purely technical training. An entrant with reasonable inherent manual dexterity at the end of one year should be able to undertake the normal cutting of cavities and filling of teeth. Thus, a large number of such technicians could be produced quickly.

The dental schools would not be able to accommodate any substantial number of such trainees without severe disorganization to their present curricula and consequent disadvantage to their own students. Yet some association with existing schools would be necessary to insure the supply of necessary patients. The difficulty could be overcome by the addition of special departments to selected hospitals or the adaptation of large existing clinics.

If such technicians were given adequate training, were properly paid and supervised by qualified men, the manpower problem could be solved.

James R. Jensen

DECREASE OF DENTAL CARIES DURING THE WAR

H. H. Neumann. Brit. D. J. 88:58, February, 1950.

Changes in the physical as well as the chemical composition of the diet resulting from war deprivation in Denmark, Sweden, Norway and Finland are discussed. Although sugar consumption was reduced in each of these countries, a corresponding caries reduction was apparent only in Norway and Finland, where the necessity of consuming coarser and older bread increased masticatory function. The author suggests that regressive effects in the organic matrix of enamel due to dental underfunction may render the enamel susceptible to bacterial invasion.

William B. Savchuck

AVAILABILITY OF FLUORINE IN SODIUM FLUORIDE VERSUS SODIUM FLUOSILICATE

F. J. McClure. Public Health Reports. 65:37, September 15, 1950.

Sodium fluoride is the source of fluorine for the majority of current studies testing the efficacy of fluoridation of community drinking water for the partial control of human dental caries. On the basis of solubility and availability of fluorine, sodium fluoride is a logical source of fluorine. At the same time in any large scale program of community water fluoridation cost is an important factor, and other fluorine compounds may be available at less expense and may be equally as efficacious. Thus, with sodium fluosilicate currently selling at about half the price of sodium fluoride, the cost of chemicals for the fluoridation of 1,000,000 gallons of water at an optimum level of 1.0 ppm fluorine is approximately $2.15 using sodium fluoride and 76 cents for an equivalent quantity of sodium fluosilicate.

A comparison was made of the effect of fluorine ingested by rats from drinking water in the form of sodium fluoride versus sodium fluosilicate; the quantity of fluorine equaled 5, 10, 15, 25 and 50 ppm.

No differences were observed in the quantity of fluorine deposited in the incisor and molar teeth, mandibles and femurs, nor in the percentage of the ingested fluorine which was retained in the rats' bodies. There were no differences in the ash, calcium, and phosphorus content of the incisor teeth, molar teeth, mandibles and femurs which could be related to the kind of fluoride ingested.

There were no differences in the appearance of the characteristic striations on the rats' incisor teeth which could be attributed to the sodium fluoride versus sodium fluosilicate.

The presence of 15 ppm of silicon as sodium silicate along with 25 ppm of fluorine as sodium fluoride did not affect the amount of fluorine deposited in the rats' bodies.

The rate of growth was normal in all groups of rats.

Heyl G. Tebo

Deaths

Algeier, Charles E., Buffalo, N. Y.; Pennsylvania College of Dental Surgery, 1892; died January 2; aged 79.

Allen, Reginald H., Oakland, Calif.; College of Dentistry, University of California, 1893; died January 6; aged 84.

Anderson, Henry B., Pittsburgh; School of Dentistry, University of Pennsylvania, 1916; died November 20; aged 58.

Anderson, John M., Sweet Spring, Mo.; Kansas City Dental College, 1901; died January 2; aged 81.

Axelrod, Arthur, New York; died October 26.

Bailey, Clayton G., Lansing, Mich.; College of Dental Surgery, University of Michigan, 1905; died December 15; aged 69.

Bailey, Frederick C., Fairfield, Ill.; Indiana Dental College, 1901; died January 15; aged 74.

Baites, John O., Huntsville, Ala.; Birmingham Dental College, 1915; died January 20; aged 68.

Baker, Byron W., Houston; Texas Dental College, 1924; died December 29; aged 51.

Baker, Harry J., Boston; Boston Dental College, 1897; died in October; aged 77.

Ball, Archibald E., Redlands, Calif.; College of Dental Surgery, University of Michigan, 1895; died January 8; aged 80.

Barbour, Phillip F. Louisville, Ky.; died September 20.

Barrett, Carleton N., Albany, Ore.; Dental School, Northwestern University, 1907; died November 30; aged 66.

Beeler, D. B., Louisville, Ky.; School of Dentistry, University of Louisville, 1906; died September 20.

Bell, James E., Cleburne, Texas; Colorado College of Dental Surgery, 1918; died December 13; aged 69.

Benedict, Richard L., West Branch, Mich.; College of Dental Surgery, University of Michigan, 1913; died December 6; aged 67.

Benson, Ulysses G., Jersey City, N. J.; College of Dentistry, Howard University, 1917; died January 25; aged 62.

Bercier, Eugene T., Kinder, La.; Baltimore College of Dental Surgery, University of Maryland, 1908; died January 15; aged 64.

Blessing, Jesse B., Bedford, Ind.; School of Dentistry, University of Louisville, 1901; died December 8.

Block, Bernard, Brooklyn; Dental School, Tufts College, 1936; died January 9; aged 39.

Bomke, Martin P., Muscatine, Iowa; Keokuk Dental College, 1905; died December 9; aged 73.

Borah, James L., Phoenix, Ariz.; School of Dentistry, St. Louis University, 1905; died January 1.

Bowker, Edith T., Berkeley, Calif.; College of Dentistry, University of California, 1899; died January 1; aged 73.

Bradford, Jasper N., Covington, Ky.; Cincinnati College of Dental Surgery, 1[illegible]; died November 18; aged 86.

Bradley, James E., Canton, Ill.; Milwaukee Medical College, 1897; died January 17; aged 88.

Brady, James B., El Paso, Texas; Kansas City Dental College, 1894; died September 13.

Brummette, George A., Tampa, Fla.; Louisville College of Dentistry, 1909; died December 15; aged 63.

Buttruff, Rolla W., Sioux Falls, S. D.; Dental School, Northwestern University, 1901; died September 11.

Carius, Marvin W., Morton, Ill.; College of Dentistry, University of Illinois, 1946; died December 9.

Carney, Duane L., Seattle; Kansas City Dental College, 1904; died December 25; aged 72.

Carr, Victor H., Ottawa, Ill.; Chicago College of Dental Surgery, Loyola University, 1922; died September 20.

Carter, John W., Worcester, Mass.; Faculty of Dentistry, McGill University, 1923; died in October.

Chandler, Willis C., Concord, N. H.; Dept. of Dentistry, Baltimore Medical College, 1901; died September 11.

Cheatham, Charles W., Ballinger, Texas; College of Dentistry, Baylor University, 1919; died December 19; aged 55.

Church, Charles A., Wilmington, Del.; Pennsylvania College of Dental Surgery, 1906; died September 19.

Clark, Arthur H., New Portland, Me.; Dental School, Tufts College, 1902; died December 30; aged 75.

Clark, John R., Reedsburg, Wis.; Dental School, Marquette University, 1908; died December 25; aged 78.

Clark, Lawrence B., Rifle, Colo.; died September 19.

Clark, Richard B., Paris, Ky.; died September 20.

Clifton, Joseph H., Fall River, Mass.; Dental School, Tufts College, 1914; died January 20; aged 61.

Coe, Thomas C., Peoria, Ill.; died September 20.

Cohlmeyer, John W., DeSoto, Mo.; School of Dentistry, St. Louis University, 1919; died September 11.

Collins, John T., Whitman, Mass.; Dental Department, Baltimore Medical College, 1900; died January 16; aged 77.

Cordes, Byron W., St. Louis, Mo.; School of Dentistry, Washington University, 1936; died December 24; aged 39.

Cornell, Elwyn S., Indianapolis, Ind.; Pennsylvania College of Dental Surgery, 1890; died January 25; aged 83.

Cox, Norris R., Portland, Ore.; died in October.

Crandall, Garrett J., Los Angeles; College of Dentistry, University of Southern California, 1906; died January 6; aged 72.

Creighton, B. W., Atlantic City; Medico-Chirurgical College of Philadelphia, 1909; died December 27.

Crenshaw, Thomas, Augusta, Ga.; died September 14.

Crone, William H., Minneapolis; College of Dentistry, University of Minnesota, 1912; died January 2.

Cumming, William A., Portland, Ore.; died in October.

Cuthbert, Clark M., Escanaba, Mich.; Chicago College of Dental Surgery, Loyola University, 1899; died December 24; aged 77.

Dailey, Grover E., Gloversville, N. Y.; School of Dentistry, University of Pennsylvania, 1906; died January 27; aged 67.

Daniel, Leo. C., El Paso, Texas; College of Dentistry, Baylor University, 1941; died November 11; aged 36.

Darracott, Seisel B., Marksville, La.; School of Dentistry, Tulane University, 1915; died in October.

Dart, Ewing K., Santa Maria, Calif.; College of Physicians and Surgeons, 1903; died December 18.

Davis, Arthur B., Newmarket, N. H.; died September 11.

Davis, Howard M., Scranton, Pa.; died January 3.

Deer, Clark T., Cincinnati; Cincinnati College of Dental Surgery, 1901; died December 28; aged 85.

Demski, Stanley J., Chicago; Chicago College of Dental Surgery, Loyola University, 1918; died November 30.

DePass, Addison R., Columbia, S. C.; Baltimore College of Dental Surgery, University of Maryland, 1902; died September 13.

Deutsch, Maurice G., Santa Monica, Calif.; Chicago College of Dental Surgery, Loyola University, 1934; died July 30; aged 42.

Dial, Richard T., Columbia, S. C.; Baltimore College of Dental Surgery, University of Maryland, 1905; died September 11.

Dingman, Florence, Johnstown, Pa.; Pennsylvania College of Dental Surgery, 1907; died December 3; aged 77.

Dishian, Manoog, Paterson, N. J.; New York College of Dentistry, 1917; died February 6; aged 56.

Doherty, Francis J., Worcester, Mass.; Baltimore College of Dental Surgery, University of Maryland, 1926; died in October.

Doran, Clarence W., Freeport, Ill.; Dental School, Marquette University, 1925; died November 25; aged 49.

Douttiel, George W., Cleveland; School of Dentistry, Western Reserve University, 1903; died January 25.

Dowell, Chester M., Huntingburg, Ind.; Indiana Dental College, 1904; died January 1; aged 69.

Downs, Clinton A., Colorado Springs, Colo.; College of Dentistry, New York University, 1895; died September 19.

Driver, Ralph B., Philip, S. D.; College of Dentistry, University of Illinois, 1907; died September 11.

Durden, Whit H., Douglas, Ga.; Atlanta Southern Dental College, 1934; died October 13; aged 42.

Ebert, Robert F., El Paso, Texas; College of Dentistry, University of Tennessee, 1900; died December 20; aged 78.

Ebling, Chester F., Enumclaw, Wash.; Western Dental College, 1912; died January 8; aged 60.

Eggeman, Minot G., St. Louis; School of Dentistry, St. Louis University, 1920; died January 22; aged 52.

Eller, L. R., Fairfield, Iowa; Chicago College of Dental Surgery, Loyola University, 1905; died January 27; aged 71.

Evans, Michael F., Detroit; College of Dental Surgery, University of Michigan, 1911; died January 14; aged 66.

Farnsworth, Elred B., Magna, Utah; Kansas City Western Dental College, 1932; died Decembr 28; aged 43.

Felch, William P., New Castle, Pa.; Pennsylvania College of Dental Surgery, 1899; died November 10; aged 73.

Field, George W., London, England; Dental School, Harvard University, 1893; died January 2.

Findlay, James G., Superior, Wis.; Baltimore College of Dental Surgery, 1890; died January 14.

Franko, Anthony A., Detroit; Dental School, Northwestern University, 1934; died January 13; aged 43.

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Ninety-Second Annual Session	Oct. 15-18, 1951	Washington, D. C.
Ninety-Third Annual Session	Sept. 8-11, 1952	St. Louis
Ninety-Fourth Annual Session	Sept. 28-Oct. 1, 1953	Cleveland

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Alabama	April 16-18	Birmingham	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Alaska			J. Geyer	Box 915, Juneau
Arizona	April 5-7	Tucson	H. G. DeWolf	Valley National Bank Bldg., Tucson
Arkansas	April 8-11	Little Rock	D. M. Hamm	White Bldg., Clarksville
California	April 16-18	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	April 2-4	Los Angeles	C. A. Moss	1401 S. Hope St., Los Angeles
Colorado	Oct. 1-4	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	April 25-27	New Haven	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			S. J. Krygier	309 S. State St., Dover
District of Columbia			K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	April 29-May 2	Hollywood	L. M. Schulstad	Professional Bldg., Bradenton
Georgia			J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	Sept. 27-29	Kailua	J. H. Dawe	810 N. Vineyard St., Honolulu 17
Idaho		Lewiston	H. M. Klaaren	Breier Bldg., Lewiston
Illinois	May 7-10	Peoria	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 21-23	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 7-9	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 6-9	Wichita	F. A. Richmond	Brotherhood Bldg., Kansas City
Kentucky	April 2-4	Louisville	A. B. Coxwell	1976 Douglass Blvd., Louisville
Louisiana	April 26-28	New Orleans	J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine	June 28-30	Rockland	F. P. Gilley	31 Central St., Bangor
Maryland	May 7-9	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts	April 29-May 2	Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	April 16-18	Detroit	F. Wertheimer	Michigan Dept. of Health Lansing
Minnesota			C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	April 29-May 2	Jackson	H. M. Campbell	Tupelo
Missouri	April 1-4	St. Louis	R. R. Rhoades	201 Merchants Bank Bldg Jefferson City
Montana	May 3-5	Billings	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska	May 14-16	Lincoln	F. A. Pierson	Federal Security Bldg., Lincoln
Nevada	June 1, 2	Reno	W. R. Bell	Medical Arts Bldg., Reno
New Hampshire	June 17-19	Bretton Woods	F. E. Williams	814 Elm St., Manchester
New Jersey	April 11-13	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 21-23	Sante Fe	J. S. Eilar	Suite 7, Medical Arts Square, Albuquerque
New York	May 7-11	Buffalo	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	April 30-May 2	Pinehurst	B. N. Walker	Liberty Life Bldg., Charlotte
North Dakota	May 17-20	Grand Forks	J. H. Lunday	Fargo
Ohio	Nov. 25-28	Cleveland	E. G. Jones	185 E. State St., Columbus
Oklahoma	April 15-18	Oklahoma City	R. C. Calkin	109½ W. Oklahoma, Guthrie
Oregon			H. C. Fixott, Jr.	308 Selling Bldg., Portland
Panama Canal Zone			O. Slavin	Box 415, Balboa
Pennsylvania	Sept. 11-14	Pittsburgh	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico			J. F. Suarez	Box 3863, Santurce
Rhode Island	Jan. 1952	Providence	M. L. Biderman	144 Westminster St., Providence
South Carolina	May 6-8	Charleston	J. R. Owings	201 E. North St., Greenville
South Dakota	May 20-22	Watertown	E. W. Elmen	Sioux Falls
Tennessee	May 7-9	Nashville	E. J. Justis	Exchange Bldg., Memphis

State	Date	Place	Secretary	Address
Texas	April 30-May 3	San Antonio	W. Ogle	310 N. Ervay St., Dallas
Utah		Ogden	B. P. McBride	Medical Arts Bldg., Salt Lake City
Vermont	May 20-22	Woodstock	J. A. Larrow	Middlebury
Virginia	April 9-11	Richmond	J. E. John	804 Medical Arts Bldg., Roanoke
Washington			C. R. Flood	1130 Medical-Dental Bldg., Seattle 1
West Virginia	July 16-18	White Sulphur Springs	A. B. Drake	508 West Virginia Bldg., Huntington 1
Wisconsin			R. A. Mason	964 N. 27th St., Milwaukee
Wyoming	June 20-23	Sheridan	T. J. Drew	State Capitol, Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 18	Birmingham	M. D. Edwards	120 Adams, Montgomery
Alaska	Aug. 6-11	Ketchikan	J. H. Geyer	Juneau
Arizona			R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 25-28		H. O. Weatherly	205 Halter Bldg., Conway
California			K. I. Nesbitt	507 Polk St., San Francisco 2
Colorado	June 18-22	Denver	W. D. McCarthy	724 Republic Bldg., Denver 2
Connecticut	June 19-23*	Hartford	C. G. Brooks Recorder	302 State St., New London
Delaware	June 27-29*	Wilmington	P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. M. Falls	1801 Eye St., N. W., Washington 6
Florida	July 9-14*		A. W. Kellner	P. O. Box 155, Hollywood
Georgia			R. C. Coleman	State Capitol Bldg., Atlanta 3
Hawaii			H. L. Houvener	7-8 Pantheon Bldg., Honolulu
Idaho			F. L. Luce	510 First National Bank Bldg., Boise
Illinois	June 26-29	Chicago	W. A. McKee	503 Wood Bldg., Benton
Indiana	June 19-22	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa	May 21-25*	Iowa City	H. M. Willits	719 Roshek Bldg., Dubuque
Kansas	June 6	Kansas City	G. L. Teall	Hiawatha
Kentucky	June 4-8*	Louisville	R. I. Todd	Western Union Bldg., Richmond
Louisiana			A. R. deNux	Marksville
Maine	June 18-21	Boston	R. A. Derbyshire	Box 387, Skowhegan
Maryland			W. D. Day	3811 Hadley Square E., Baltimore 18
Massachusetts	June 25-29‡ June 27-29‡‡	Boston	J. C. Wilson	33 State House, Boston
Michigan	June 10	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota			F. A. Larson	1632 Washington St., N.E., Minneapolis
Mississippi			J. C. Boswell	508 Lamar Bldg., Jackson
Missouri			R. R. Rhoades	Central Trust Bldg., Jefferson City
Montana			P. M. Feda	Box 865, Helena
Nebraska	June 1, 2** June 4-6††	Lincoln Lincoln and Omaha	C. A. Bumstead	924 Stuart Bldg., Lincoln
Nevada			G. C. Steinmiller	Masonic Temple, Reno
New Hampshire	June	Boston	J. B. Brown	5 N. State St., Concord
New Jersey	June 18, 19†† June 25, 26†† June 27-29**	New York Philadelphia Trenton	W. A. Wilson	150 E. State St., Trenton 8
New Mexico	June 18-21	Santa Fe	J. J. Clarke, Sr.	Artesia
New York			D. W. Beier	23 S. Pearl St., Albany 7
North Carolina	June 25	Raleigh	F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	July 9-12	Fargo	A. B. Crabtree	Ellendale
Ohio	June 25-29	Columbus	E. D. Lowry	79 E. State St., Columbus
Oklahoma	June 18-20		J. B. Cole, Jr.	706 Asp, Norman
Oregon	June 11-15	Portland	A. F. Davis Exec. Secy.	306 Public Service Bldg., Portland
Pennsylvania	May 21-23† and May 22‡	Pittsburgh	R. E. V. Miller	Northampton National Bank Bldg., Easton
	June 4-6† and June 5‡	Philadelphia		
	June 18-20† and June 20‡	Philadelphia		
	June 21-23**	Philadelphia and Pittsburgh		
Rhode Island			F. M. Hackett	State Office Bldg., Providence
South Carolina	June 18	Columbia	E. G. Bumgardner	1517 Hampton St., Columbia

State	Date	Place	Secretary	Address
South Dakota			R. W. Ellis	Salem
Tennessee			F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas			R. T. Weber	312 Capital National Bank Bldg., Austin
Utah			J. J. Dalpiaz	Helper
Vermont	June 25-27	Burlington	F. A. Reid	Windsor
Virginia	June 12	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond 19
Washington	June 18-22	Seattle	J. B. Kiefer, Jr.	510 Cobb Bldg., Seattle
West Virginia	June 25-27	West Liberty	C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin	June 18*	Milwaukee	S. F. Donovan	Tomah
Wyoming			W. J. Ryan	208 Boyd Bldg., Cheyenne

*Dentistry and dental hygiene.
†Dental clinical examinations.
‡Dental hygiene clinical examinations.
§Dental examinations.

**Written examinations.
††Clinical examinations.
‡‡Hygienists' examinations.

OTHER MEETINGS

Name	Date	City	Secy. or Chm.	Address
Academy of Denture Prosthetics, Annual Meeting	April 30-May 6	Washington, D. C.	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
American Academy of Dental Medicine	June 22-24	Atlantic City, N. J.	W. M. Greenhut Secy.	124 E. 84th St., New York 28
American Association for Cleft Palate Rehabilitation	April 27, 28	Philadelphia	R. L. Harding Chm.	813 N. Second St., Harrisburg, Pa.
American Association of Industrial Dentists, Annual Meeting	April 24-26	Atlantic City, N. J.	F. J. Walters Secy.	4068 Federal Security Bldg., South, Washington 25, D. C.
American Association of Orthodontists, Annual Meeting	April 23-26	Louisville, Ky.	G. R. Moore Secy.	919 Oakland Ave., Ann Arbor, Mich.
American Board of Oral Surgery	April 7-10	Chicago	L. M. FitzGerald Secy.	718 Roshek Bldg., Dubuque, Iowa
American Dental Society of Europe	Aug. 1-4	Lausanne, Switzerland	F. D. Derrick Secy.	140 Park Lane, London, W.1.
Canadian Dental Association, Annual Meeting	Sept. 23-26	Ottawa, Ontario	D. W. Gullett Secy.	234 St. George St., Toronto 5, Ontario, Canada
International Academy of Anesthesiology	May 16	New York	I. G. Tomack Exec. Secy.	355 E. 149th St., New York 55
Iowa Conference in Oral Surgery	April 20, 21	Iowa City	J. G. Whinery Chm.	State University of Iowa Hospitals, Iowa City
National Board of Dental Examiners	April 9, 10		Shailer A. Peterson Secy.	222 E. Superior St., Chicago 11
National Dental Association, Thirty-Eighth Annual Meeting	Aug. 13-17	Memphis, Tenn.	J. A. Jackson Secy.	P. O. Box 197, Charlottesville, Va.
Northwest Conference in Dental Medicine, Eighth Annual Meeting	April 8-13	Sun Valley, Idaho	A. Tworoger Exec. Secy.	2428 Forty-Second, N., Seattle 2
Pacific Coast Dental Conference (Eighth)	June 25-28	Seattle	C. R. Flood Secy.	605 Medical-Dental Bldg., Seattle 1
Southern Society of Orthodontists, Twenty-Seventh Annual Meeting	July 31-Aug. 2	White Sulphur Springs, W. Va.	F. P. Bowyer Secy.	608 Medical Arts Bldg., Knoxville, Tenn.
Twelfth Congress of French Stomatology	October	Paris, France	P. Friez Secy.	42 Rue Notre-Dame-des-Champs, Paris VI, France

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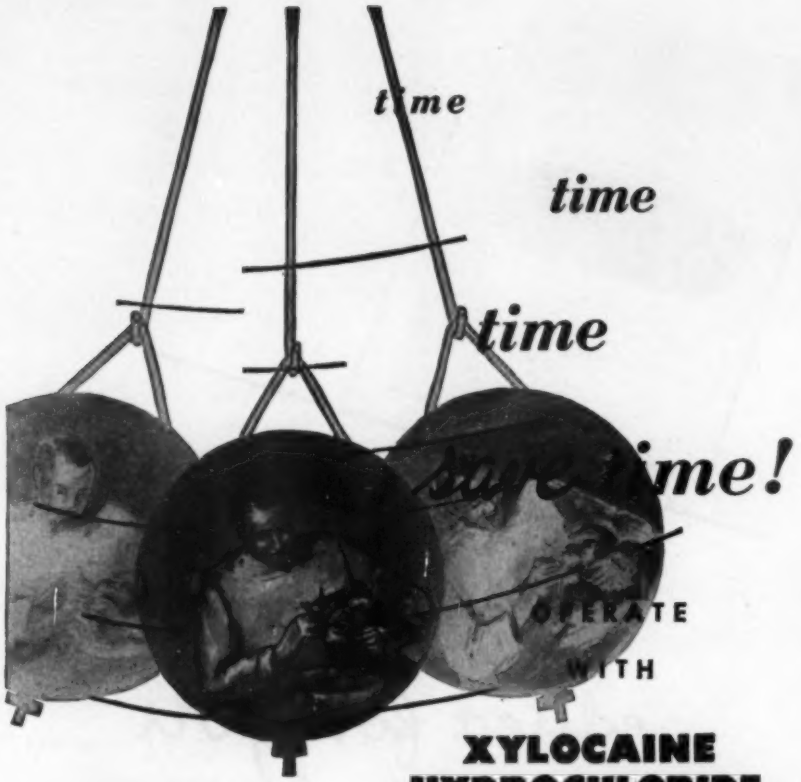

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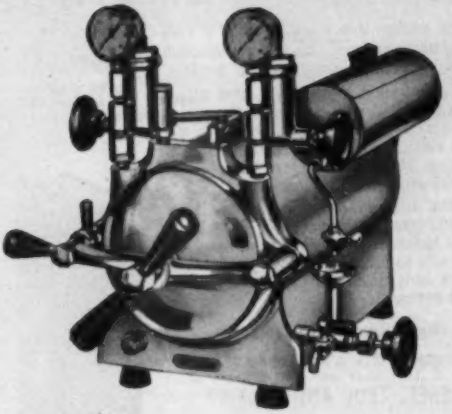

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Fig. 552. Diagrammatic representation of factors leading to pericoronitis. Note irritation from opposing upper third molar. (From Miller's "Textbook of Periodontia"—3rd Edition).

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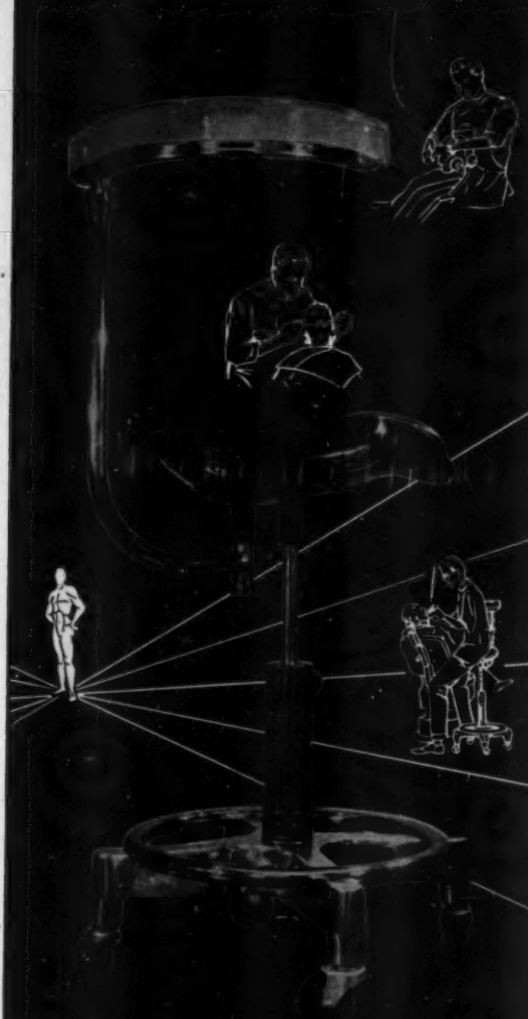

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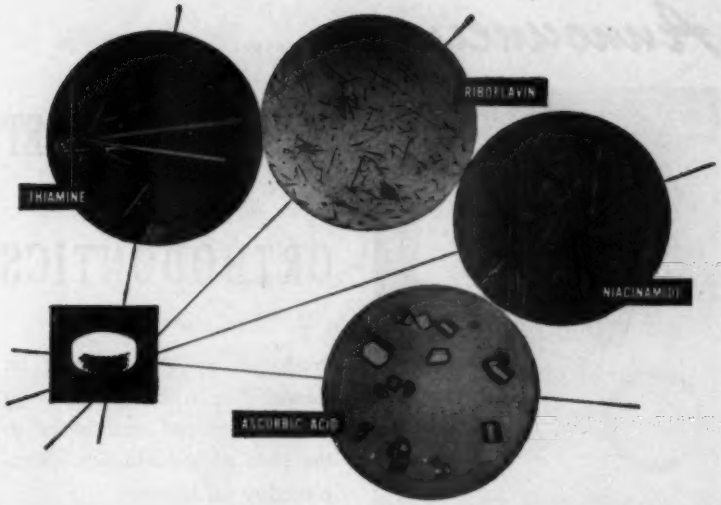

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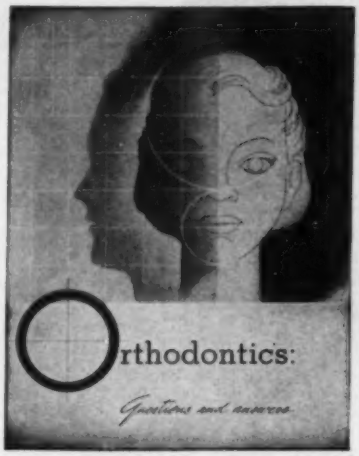

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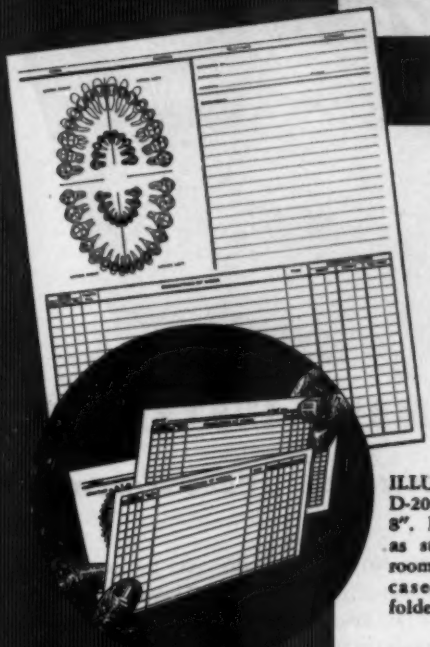

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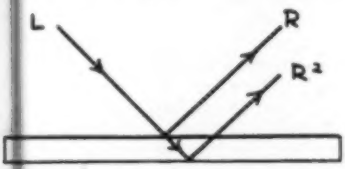

Ghost Image is Reflected from Glass Surface (L-R). Main Image is Reflected from Mirror Backing (L-R2)*.

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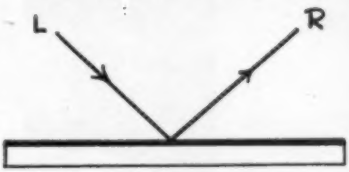

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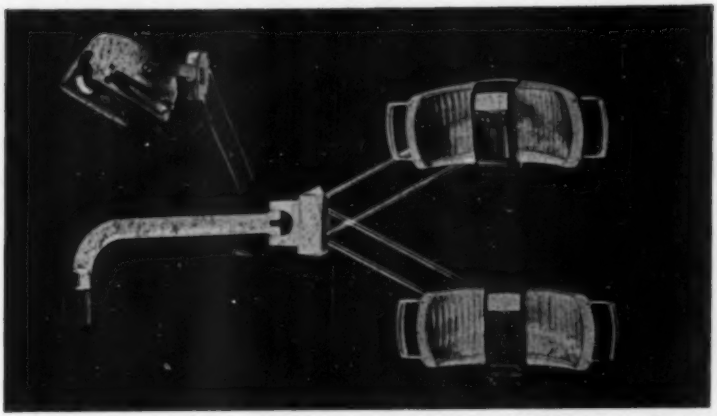

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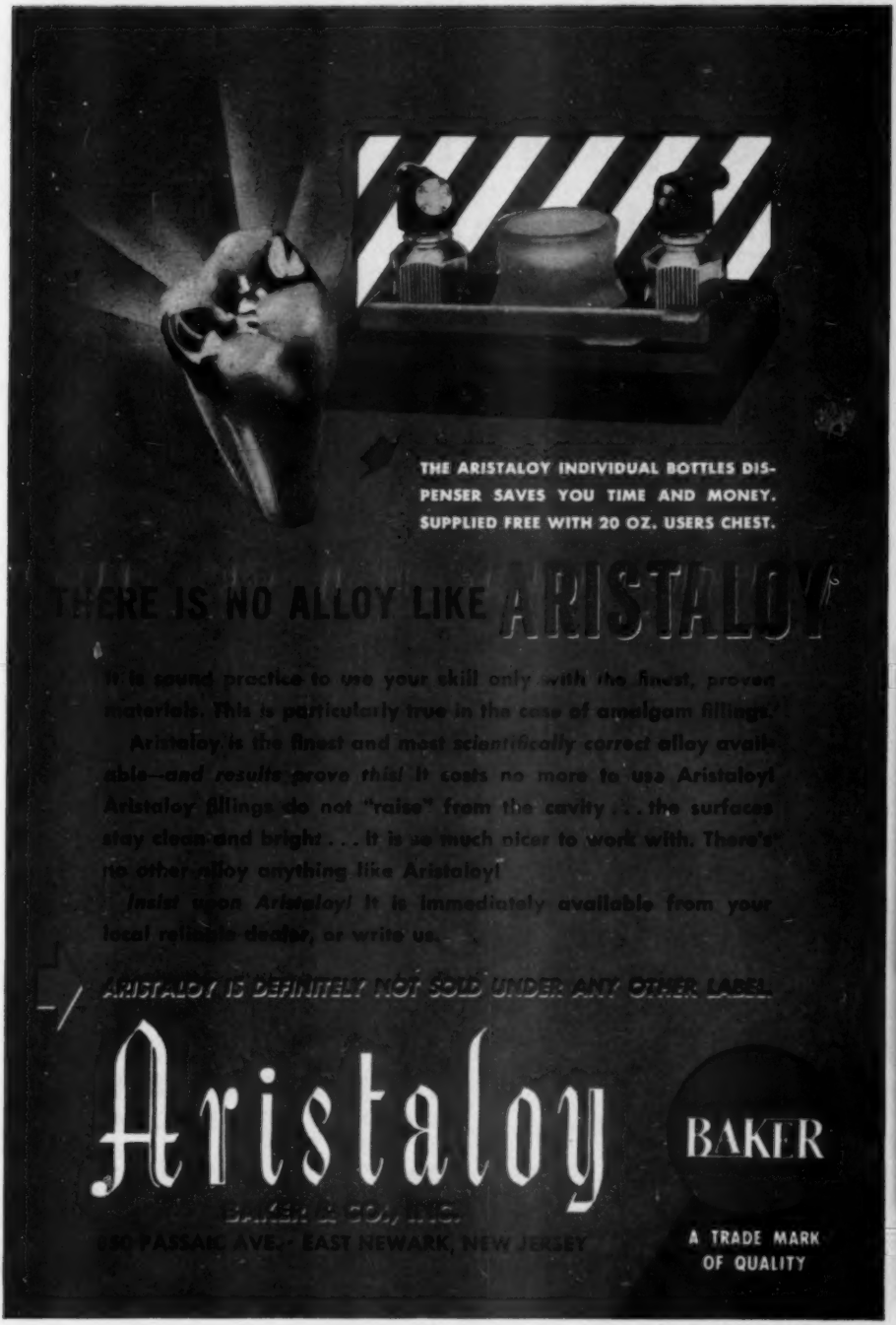
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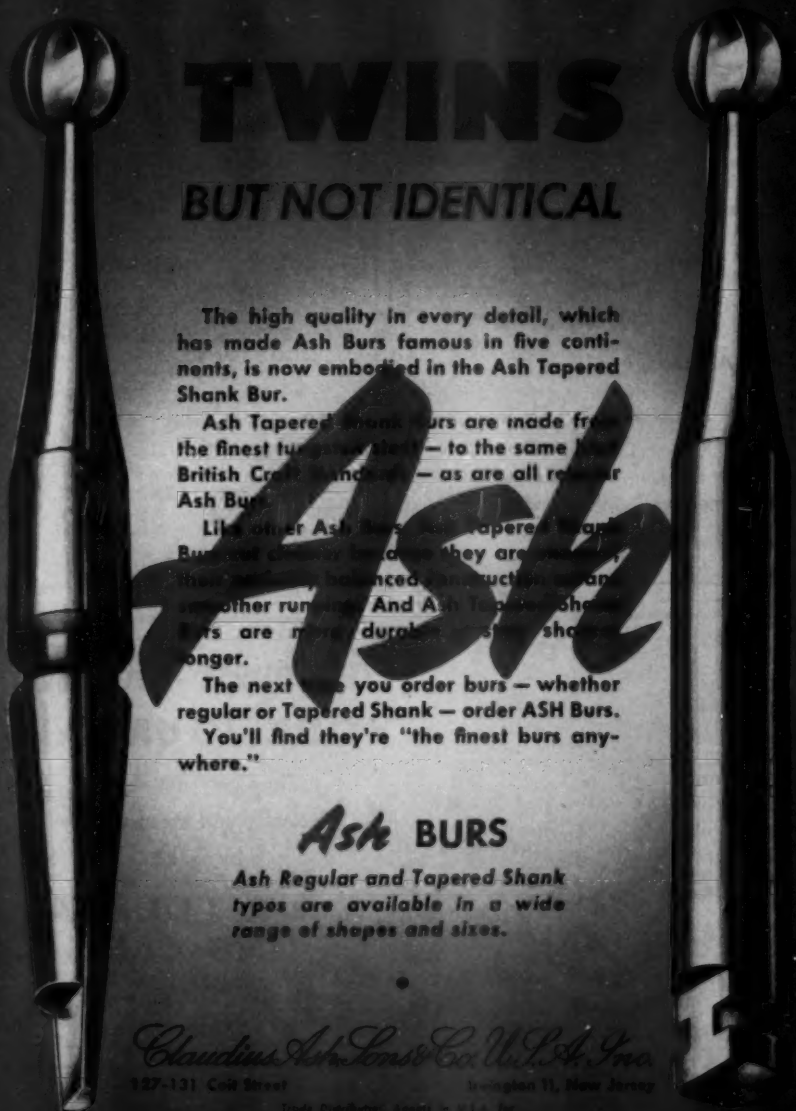

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• • •

The average income of dentists in 1950—with 89% of them in general practice—jumped 20% over the $6,912 they made in 1948.

• • •

Horace H. Hayden (1789-1844), founder of the first dental school, and first dental practitioner to be registered in the U.S., was also a famous geogolist. He published the first general work on geology in America, in 1821, and discovered a new mineral which was named Haydenite, in his honor.

• • •

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• • •

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• • •

Although printing was invented around 1450, and toothache is as old as mankind, the first book on dentistry in the English language was not printed until 1685. It was written by Allen and published in York, England.

• • •

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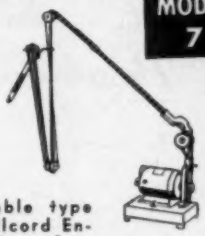

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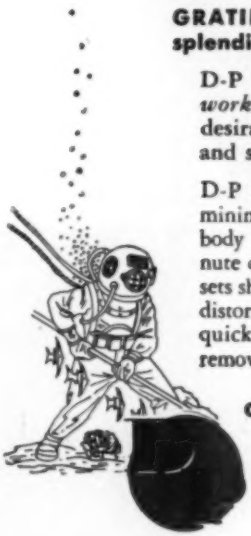

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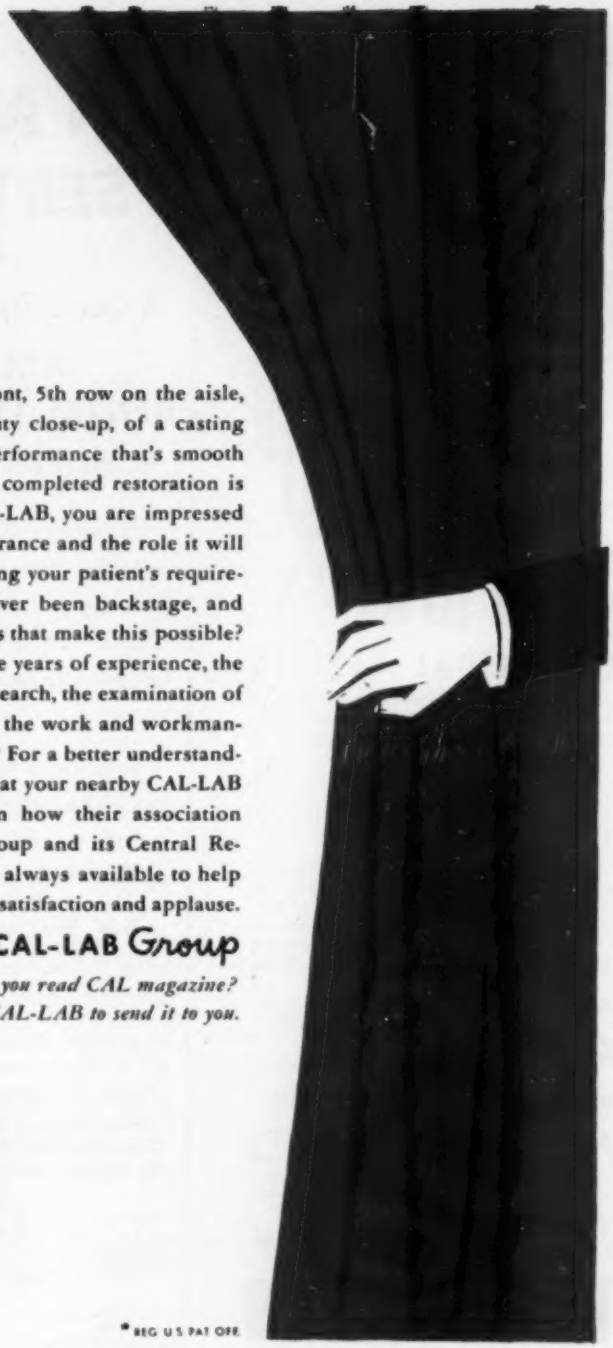

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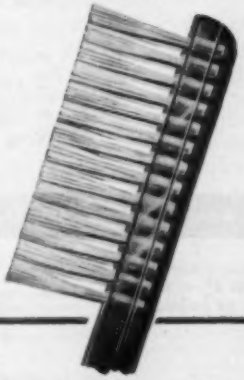

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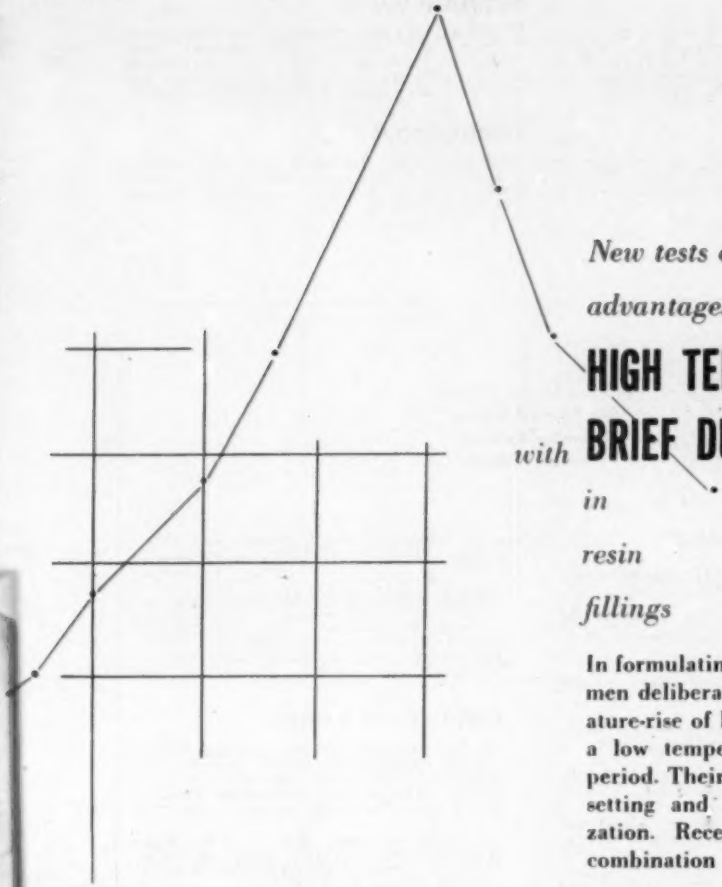

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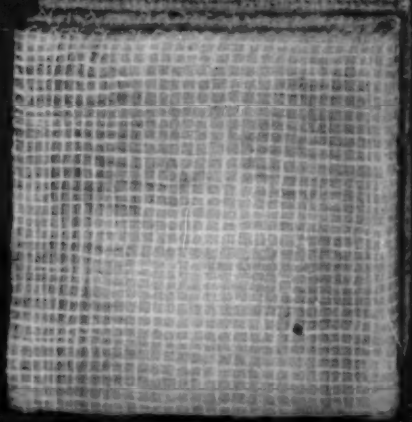

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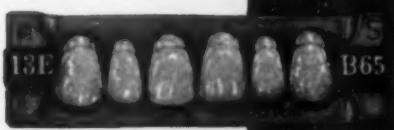

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